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HARPER'S STORY BOOKS.

A SERIES OF NARRATIVES, DIALOGUES, BIOGRAPHIES, AND TALES,
FOR THE INSTRUCTION AND ENTERTAINMENT
OF THE YOUNG.

BY

JACOB ABBOTT.

Embellished with

NUMEROUS AND BEAUTIFUL ENGRAVINGS.

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THE
HARPER
ESTABLISHMENT;
OR,
HOW THE STORY BOOKS ARE MADE.

by
J. C. Abbott

HARPER & BROTHERS.



NEW YORK:
HARPER & BROTHERS, PUBLISHERS.



Entered, according to an Act of Congress, in the year one thousand eight
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P R E F A C E.

THIS series of Story Books, though they are intended to be written in a simple and lucid style, so as to bring them within the comprehension of all, are by no means designed exclusively for children. The subjects of many of them will be such that they can only be appreciated by minds that have attained to some degree of maturity, and are accustomed to habits of careful and patient thought.

The subject of the present number, the great Printing Establishment of the Harpers in New York, is one of this class; and though I have endeavored to make my description sufficiently full in its character, and simple in its details, to be intelligible to every class of readers, I have made no attempt to bring it down to the capacity of children. The older and the more thoughtful of the sons and daughters of a family may derive great instruction from the perusal of it, especially if they are assisted by the explanations of the father and mother as they read, but the younger ones must expect to find it above their reach. They had their turn in the Story of Timboo and Fanny.

I have taken great pains to make all the statements contained in the work in respect to all the structures, machines, and process-

es described strictly exact, so that gentlemen in the interior of the country, who take a practical interest in subjects connected with mechanical science, may rely on the correctness and accuracy of the information which this account furnishes. In these efforts I have been greatly assisted by the various gentlemen who have had the charge of the several portions of the work of constructing the edifice, as well as those who are now employed as overseers in the different processes of manufacture. I have been especially indebted to the following named persons not only for information obtained from them, in the first instance, in respect to the various branches to which their responsibility extends, but also for their assistance in the careful revision of my descriptions and statements after they were written :

JAMES BOGARDUS, Engineer, constructor of the iron front of the building.

JOHN B. CORLIES, Architect and Builder.

JAMES L. JACKSON, designer and manufacturer of the iron columns and girders.

ABRAM S. HEWITT, of the firm of Cooper & Hewitt, manufacturers of the iron beams.

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THE
HARPER ESTABLISHMENT.

CHAPTER I.

GENERAL STRUCTURE OF THE EDIFICE.

Situation of the Harper Buildings.

The Franklin Square front.

THE buildings of the Harper Establishment are situated in New York, on Cliff Street and Franklin Square. The establishment covers about half an acre of ground, and consists chiefly of two blocks of buildings, one fronting on Cliff Street, and the other fronting on Franklin Square, with a court between. The two blocks of buildings are united, and made, as it were, one, by a series of iron bridges connecting the various stories of the two blocks with each other and with a large circular tower in the court, which contains the common stairway for the whole establishment. The edifice is constructed almost exclusively of stone, brick, and iron, and is as perfectly fire-proof as the present state of architectural science and art can make it.

The frontispiece represents that portion of the building which fronts on Franklin Square. It is five stories in height, with a cellar and sub-cellars below, making seven floors in all. The front is built wholly of iron. It consists in each story of twenty-one Corinthian columns, with lofty windows filling the intercolumni-

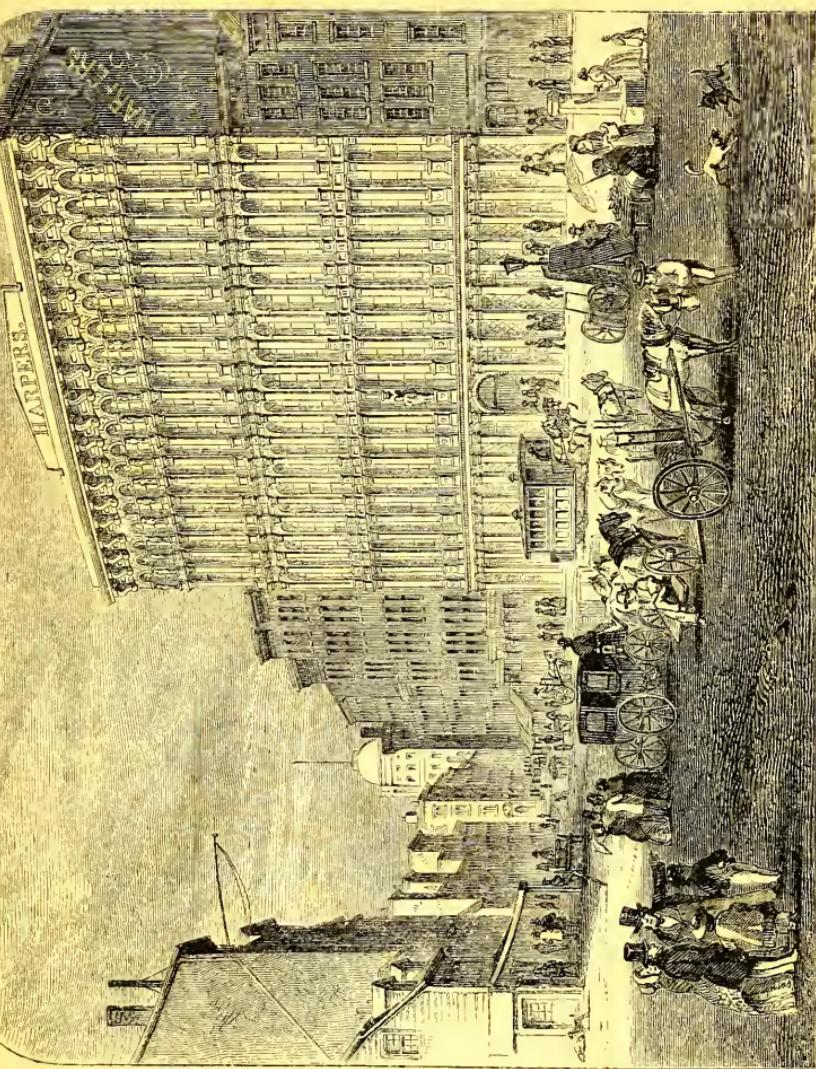
Statues.	The court-yard.	Cellars.	Stores.
ations. Each range of columns supports the bases of the range above, and thus they rise, tier above tier, to the topmost story.			

Over the entrance-door is a full length statue of Benjamin Franklin in iron. Between the windows of the fifth story, too, is a row of smaller statues of Washington, Franklin, and Jefferson. Above them is the cornice of the roof, supported by massive trusses. There is no entrance in the front of the building for the receipt and delivery of goods. The place for this business is in the court-yard between the two buildings, which is entered by a passage-way from Cliff Street. Thus the front of the building is never encumbered with carts or drays coming to or leaving the establishment, nor are the sidewalks obstructed with bundles of paper or boxes of books.

There are two cellars under this block, one of which is, however, entirely out of ground on the back side, where it fronts the court-yard. The depth of the foundation of the edifice may be inferred from the fact that the floor of the lowermost cellar is twenty-two feet below the sidewalk. A large portion of the space in these cellars is used for the storage of paper. This paper is taken across, as fast as it is wanted, into the lower stories of the building on Cliff Street by a subterranean railway under the court. This will be more particularly explained by-and-by, when we come to the engraving of the court-yard.

There are no staircases leading from one story to another in either of the buildings within the walls, but there is one common staircase for the whole establishment in the round tower already mentioned, which has been built for the purpose in the court-yard.

HARPER'S



FRANKLIN SQUARE FRONT.



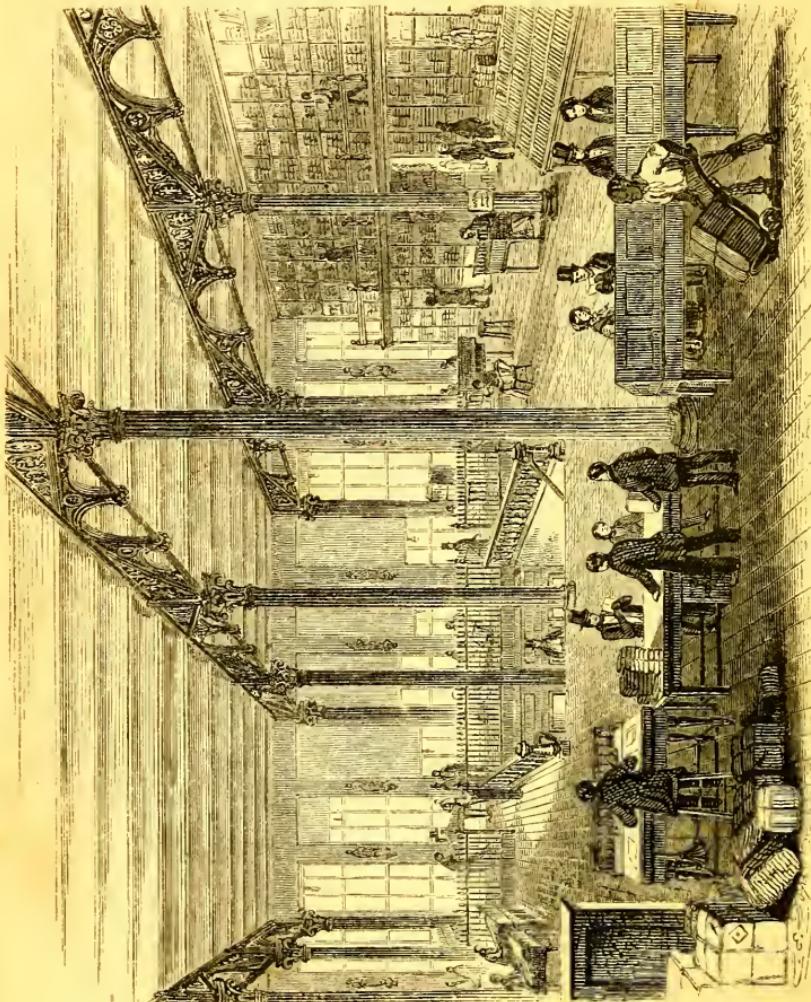
No staircases within the buildings.The counting-room.

Thus the several floors of the buildings are continuous and entire throughout. This construction is adopted as a safeguard against fire; for, as there are no openings through the floors, and as the floors themselves are built of brick and iron, and are thus completely fire-proof, no fire can be communicated through them in any way. The staircase in the tower is connected with each story of both buildings by iron bridges, and is found to be amply sufficient for all purposes. This, also, will be particularly explained when we come to the history of the court-yard.

Thus, with the exception of the great staircase ascending from the entrance-door in front to the counting-room, which will presently be described, all the floors are continuous throughout—of solid brick and iron—and thus the spread of fire among the contents of the buildings from floor to floor is rendered impossible. There is, indeed, nothing but the contents of the buildings that can burn, for the edifices themselves are constructed, almost without exception, of materials entirely incombustible.

The height of the stories, and the general magnitude of the scale on which the whole building is constructed, may be appreciated by comparing the edifice with the ordinary four and five story buildings on each side of it in the engraving. The general counting-room is in the centre of the building on this front, in the first story above the principal basement. The access to it is by a very broad staircase—twelve feet wide—ascending from the centre door. You will see the top of this staircase, and the interior of the great counting-room into which it opens, in the engraving on the next page. Besides the counting-room, this building contains the *stock* and

View of the interior of the counting-room.



THE COUNTING-ROOM.

View of the counting-room.

The four brothers Harper.

stores of the establishment, consisting of vast quantities of paper and other materials in the cellars and on the lower floors, and books by hundreds of thousands in the various stages of manufacturing stock in the stories above. The extent and the arrangement of these vast magazines will be hereafter described.

The engraving on the opposite page represents the counting-room. The view is taken from the back side of the room, looking forward. The staircase is seen in the centre, coming up from the great door on the Franklin Square front, as seen in the frontispiece. We see a person just ascending the stairs, near the top. The three other sides of the opening through which the stairs come up are inclosed by a strong and ornamental balustrade.

In the background of the picture, which represents, of course, the front side of the room, there is a rectangular space, about forty feet by fifteen, inclosed by a railing, which may be considered the counting-room proper. Here are the desks and seats of the proprietors of the establishment, with sofas and chairs along the sides of the inclosure for visitors, or persons having business with the proprietors personally. This area is the constant resort of book-sellers, authors, artists, travelers, and persons of distinction from every part of the United States, and, indeed, from all quarters of the world. The four brothers Harper, the original founders and present proprietors of the establishment, are almost always to be seen here, engaged in their various duties, such as receiving reports and listening to inquiries from the various mechanical departments, issuing orders, answering questions, holding consultations, considering new projects, waiting upon authors who come

Business of the counting-room.

The furnishing of it.

to offer manuscripts, and artists who bring in drawings or engravings, and in other like occupations. It is an animated and busy scene, though the arrangements are so complete and convenient, and the space so ample, that there is no bustle or confusion. A vast deal of very important business is transacted here, and often by men of high distinction both in the literary and business world; but it is transacted with few words, and in a very prompt and decisive, though very quiet manner.

Without the railing, on each side of the staircase, are several desks. Four of these are seen in the engraving. They are placed so as to face toward the centre of the room. They are occupied for the various departments connected with the book-keeping and accounts, and for business connected with the city trade. Beyond these, and still nearer to the foreground, are other appointments and fixtures. On the right are cases for exhibiting samples of books. There are two of these cases in different positions. One stands with its front toward us, showing us the books which it contains. The other has its back toward us. We see a lady and two gentlemen standing by it, examining the books. A clerk stands near one of the gentlemen, and seems to be conversing with him. On the left we see a large iron safe.

The cases above referred to are only intended for the purpose of showing specimens of the books which the house publish, as a guide to booksellers and others in making up their orders; for very little retail business is done at this establishment—none, in fact, except as a matter of convenience and courtesy to individual purchasers. The business of the house is almost exclusively the

Immense quantities of books in store.

The bins.

publishing of books to be sold in quantities to booksellers. The general stock, therefore, does not consist of individual copies of books arranged on shelves as in a library, as is usual in ordinary book-stores, but of *quantities* packed in bins, with specimens only in the show-cases below. We see a portion of these bins on what seems to be the side of the room on the right. It is not really the side of the room, however, which appears in the engraving, but only a double block or tier of bins built up from the floor to the ceiling, to furnish receptacles for the books. This block of bins is two stories high, as seen in the engraving. Access to the upper story is obtained by means of a gallery, which extends along the whole length of the block. We see men upon this gallery bringing books down to be packed and sent away. There are two openings like wide doorways through this construction to another part of the room, which is surrounded on all sides by bins. On the left-hand side of the room the arrangement is the same, though it is not shown in the engraving. Indeed, only about three quarters of the length of the apartment itself is shown, there being the same space between the range of columns on the left and the range of bins forming the partition, that there is on the right, though this space in the engraving is cut off on the left side. This space is twenty feet, and the whole length of the part of this floor of the building which is inclosed between the two ranges of bins is eighty feet. The depth of the apartment from front to back is seventy-five feet. Beyond, on both sides, are wings, which are entered through the openings in the ranges of bins above described, and which extend, including the depth of the bins, about twenty-five

The sales-room.

Boxes and bundles.

The plan.

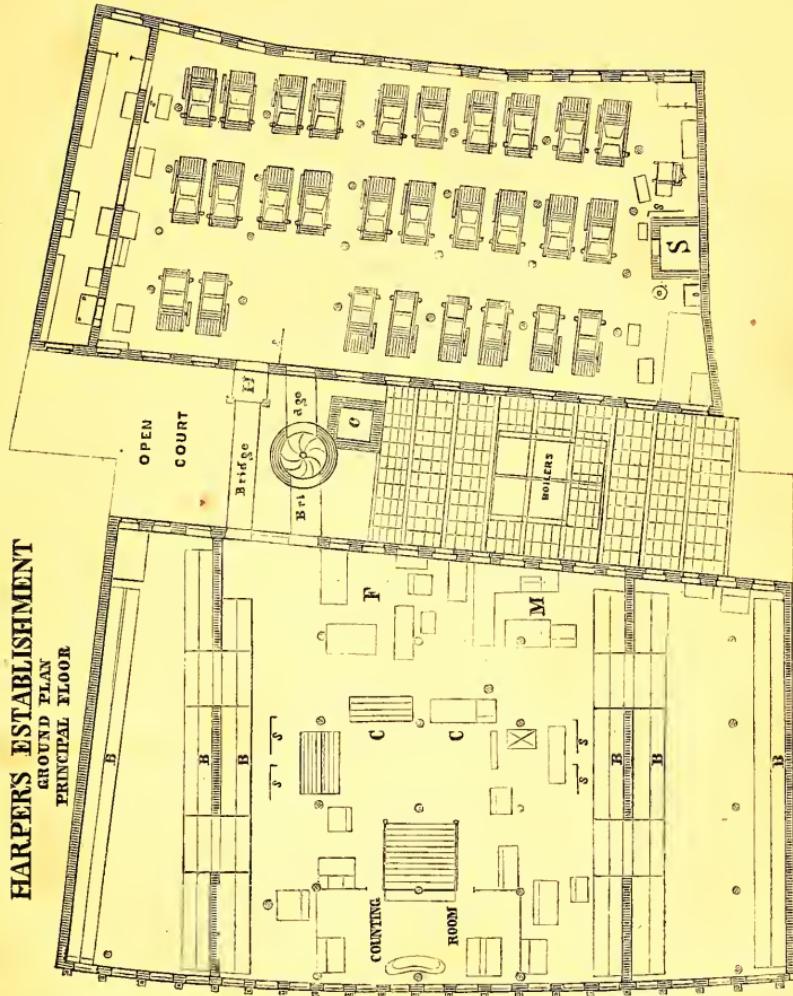
feet farther, making the whole front one hundred and thirty feet. There are four openings leading to these wings, two on each side. The number of bins on both sides of this great hall, including those within the two inner compartments, is about one thousand, and each one is of sufficient capacity to hold nearly one thousand ordinary duodecimo volumes.

The back part of the room, a small portion of which only is seen in the foreground of the engraving, is occupied for the purpose of filling orders for books, packing the books in boxes and bundles, mailing the subscribers' copies of the Magazine and Story Books, keeping sundry accounts, and other similar purposes. It is from this place that the vast issues from the establishment are daily made. The boxes and bundles are wheeled, when made up, out through a door in the rear of this part of the room, which conducts across the court by an iron bridge to the hoist-way, where the steam-engine takes them, and lets them gently down to the cart or wagon waiting in the court below. We shall see the arrangement of this mechanism more particularly when we come to the court. But the relative position of the packing-rooms, the bridge, and the hoisting, will be seen on the plan on the adjoining page.

The plan represents the first or principal floor of each building, namely, the publishing and counting-rooms of the Franklin Square building, and the great press-room in the Cliff Street building. The former is on the right, as seen in the engraving; the other on the left.

At the extreme right of the Franklin Square room is seen the counting-room, between the head of the staircase and the front of

HARPER'S ESTABLISHMENT

GROUND PLAN
PRINCIPAL FLOOR

General arrangements of the sales-room.

the building. The desks and other furniture are represented on the plan. There are two entrances to the inclosure, one on each side of the great staircase, and the space itself is only separated from the rest of the apartment by a railing, as shown in the perspective view on a previous page.

On the other side of the staircase, toward the centre of the apartment, is the area marked C; which is appropriated to the city trade. It is very convenient for this purpose, being easily accessible from the entrance to the building. The area is partially inclosed by desks, safes, counters or cases for the exhibition of samples of books, and other similar furniture. These objects are represented in the plan, but they can be seen still more distinctly in the perspective view.

At the back side of the room, near the centre, is the area marked F, devoted to the business of receiving and answering foreign orders. Here are large tables for assembling and packing books, and desks for keeping the accounts, and trucks for drawing away the boxes and packages, when they are made up, to the door leading to the hoist-way, which is close at hand. There are two doors, indeed, leading to the court, near this part of the building. One opens upon the bridge that conducts to the hoist-way, the other to the one that leads to the staircase in the round tower, and thus to all parts of the Cliff Street building. These two bridges are seen in the plan.

To the right of the space devoted to the foreign trade, looking toward the back side of the room, is another inclosure, marked M on the plan, which is appropriated to the work of mailing peri-

Ranges of bins.

Plan of the court.

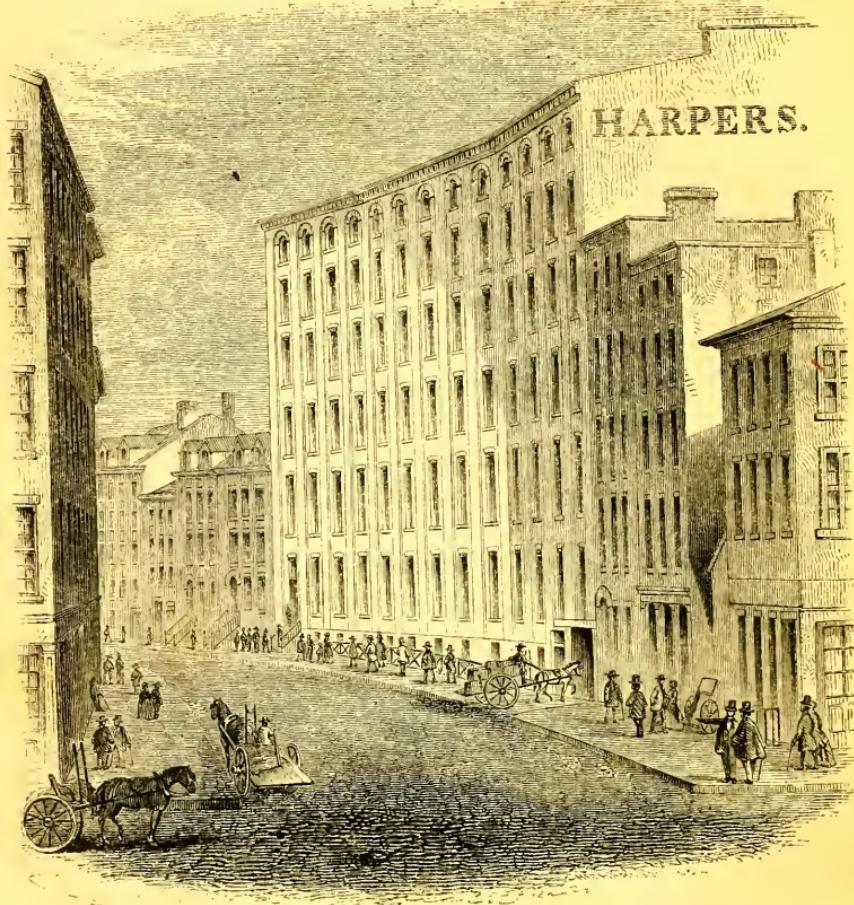
- The great press-room.

odicals. The great business at this place is, of course, the mailing of the subscribers' copies of the Magazine.

On the north and south sides of the apartment may be seen the ranges of bins, marked B, B, B on the plan, surrounding two inclosures of the form of wings. These bins consist of ranges of very strong shelving, about five feet deep, separated by a solid brick wall, which forms the back of the rows of bins. The partitions extend from the floor to the ceiling. The upper tiers are reached by galleries, as seen in the perspective view. The open court, marked in the plan, is accessible by carts through an arched passage-way in Cliff Street. This passage-way is not shown on this plan, being on the story below the one here represented. The two walls inclosing it are, however, seen at the end of the Cliff Street building. The position of two of the bridges, the hoist-way, H, the circular tower, the great square chimney, c, as well as of the glass roof that covers the boiler-room, are shown in the plan. A perspective view of this court-yard, with a more full account of the various objects which it contains, will be given in a subsequent chapter.

The plan shows the arrangement of the presses in the great press-room of the Cliff Street building. This room is on the principal story, that is, the first above the basement. The other floors of this building are all appropriated to the various mechanical operations connected with the printing and binding of books. They will be described hereafter. In the mean time, a view of the front of this portion of the edifice is given on the next page. The opening where we see the cart going in is the entrance to the court.

View of the front on Cliff Street.



VIEW OF THE CLIFF STREET FRONT.

Difficulty of making large buildings fire-proof.

CHAPTER II.

THE FIRE-PROOF FLOORS.

THE great difficulty in the construction of fire-proof buildings is the work of making the floors. Walls may easily be built of brick or stone, but wood alone has been considered hitherto, until within comparatively a short time, almost essential for floors; since for floors, which must necessarily, to so great an extent, sustain themselves, with as little support as possible from below, there is required a degree of strength and lightness combined which has hitherto been found to exist in no other material.

It is true that architects have long been accustomed to build floors of brick or stone by supporting them on arches, which rest on columns or walls in the room below; but these arches, on any mode of construction heretofore adopted—at least until within a few years—have required columns or walls to support them so massive and solid, that the room below was necessarily encumbered with obstructions, and made, indeed, almost useless, in order to furnish support for the floors of the rooms above. We see this construction in the basement stories of the old and central portions of the Capitol at Washington, the New York Exchange, and in such buildings as the Pantheon in Paris. In all these and similar buildings, the basement story is rendered dark, and gloomy, and dungeon-like by the immense number and massive forms of the walls, piers, columns, and groined and vaulted arches, necessary

Floors of masonry in churches.

Requirements of modern buildings.

to support the floor of the principal story above. Then, again, above this principal story, in such buildings, there could be usually nothing; for the rooms in it, if large, as in most cases they must necessarily be, could only be kept free from obstructions similar to those below by some vast roof or dome for a covering, constructed at great expense, and rising necessarily so high as to preclude the possibility of having any useful apartments above it.

All this, however, was of no very serious consequence in the case of churches, and other similar structures, where the dungeon-like basement might be used as a *crypt* for tombs and other such purposes, and where, also, the very nature of the edifice required that all the space above the principal floor should be occupied as one story. It was very different, however, with such buildings as are required for the practical purposes of modern mechanical arts. In these cases, what is necessary is to divide the whole height of the building—fifty or eighty feet, perhaps—into many distinct stories by floors made as thin as possible, so as to economize space, and each self-sustaining, so as not to encumber the story below it with supports. To do this with wood has been easy. But wood is highly combustible. How to do it with any incombustible material has long been a great desideratum. The object was at length finally accomplished, and the first successful construction by the new method, as at length perfected, is the edifice we are describing. Indeed, it was in the construction of this edifice that the method was perfected.

If the reader will turn back to the engraving of the counting-room in page 16, and look up to the ceiling, he will readily under-

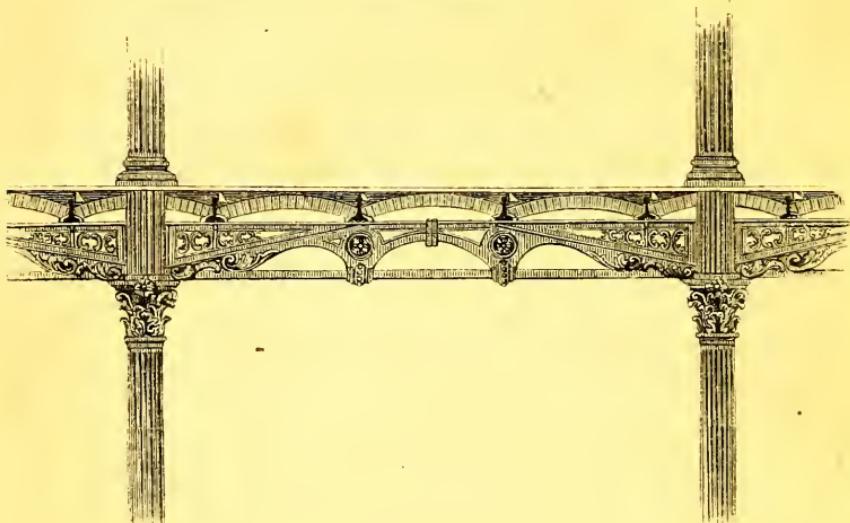
General arrangement of the columns and girders.

stand the mechanism of these floors, for the whole structure is there almost entirely exposed to view. You observe three rows of columns extending through the room from front to back. These columns support a range of ornamental girders, the mechanism of which will be hereafter explained. Each one is essentially a cast iron arch, the lower ends of which are connected by a rod of wrought iron. The form of it may be likened to a *bow* of cast iron, with a wrought iron *string*. Upon the girders, and extending from one row of pillars to the other, there rest the ends of a range of *wrought* iron beams. The double lines seen in the engraving in the ceiling, running from left to right, from one range of columns to another, represent the lower edges of these beams. The beams themselves, by means of broad flanges wrought on the lower side of them, support a series of flat brick arches, which extend from one to another of them, and thus furnish a continued bearing for the flooring above. The upper surface of the arches, when the masonry was completed, was leveled by filling up the spandrels with grouting, strips for nailing the floor-boards to having been previously laid for the purpose, and then the whole was covered with a wooden floor.

Thus the whole structure consists simply of a series of long, narrow, flat brick arches, supported by wrought iron beams, the ends of the beams being supported in their turn by girders of wrought and cast iron, and these by a range of cast iron columns, supported by a similar range in the story below.

The whole system is accurately represented in the following drawing.

Explanation of the mechanism of the fire-proof floors.



MECHANISM OF THE FLOORS.

The round rod connecting the ends of the girders is the tension-rod. It is of wrought iron. It acts as a tie-beam to prevent the two ends of the girder from spreading by the pressure of the weight on the arches above. These rods are two and a half inches in diameter. The whole mass of iron lying between the tension-rod and the range of arches above forms the body of the girder, and is cast in two parts, one for each side, the line of division being at the centre. These parts correspond in their function to the rafters of a roof, while the tension-rod answers to the tie-beam. The tendency of the weight resting on the floors above is to crowd the centre ends together, and to force the lower ends of the gird-

Operation and effect of the tension-rods.

Ornamented pattern of the girders.

er apart, thus bringing a heavy lateral strain upon the tension-rod. Indeed, it is on the power of the tension-rod to resist this strain that the whole security of the structure depends.

Were it not for the action of these tension-rods, the lateral thrust, as it is termed, of the girders—that is, the tendency to spread at the base, in consequence of the pressure of the weight above, would come upon the heads of the columns, and thence would be communicated from girder to girder to the sides or ends of the building, being increased in its passage by the lateral thrust of all the girders in the line. This would produce a pressure against the walls of the building which it would require an enormous thickness of the walls to resist. As it is, each tension-rod counteracts the lateral thrust of its own girder, and thus every thing is independent and self-sustaining.

The cast iron part of the girder appears somewhat complicated in its form, but it is very simple in its functions, which is, in fact, precisely that of a pair of rafters in a common roof. As to its form, any intelligent mechanic whose attention may be attracted to this drawing will observe that the leading outlines of the form are determined by the necessity of increasing the strength and thickness of the iron in those parts of the girder where the great strains would come. The pattern is ornamented, too, with great judgment and taste. These ornaments are, on the whole, not expensive, since, as the girders are cast, and a great number are thus formed from one pattern, the expense of carving the pattern is widely distributed.

The girders are of different sizes in different parts of the build-

Construction of the arches.

They were laid dry and grouted.

ings, on account of the different distances of the ranges of columns that support them. They vary from five hundred and forty pounds to eight hundred and sixty each for the cast iron part. The tension-rods weigh about two hundred and forty pounds each.

But let us now return to the drawing. Above the girders, and resting upon the iron beams, the ends of which are seen represented black in the drawing, are the brick arches. These arches are about four feet span, that being the distance of the beams from each other, and are four inches thick. They extend, of course, in length, from one range of columns to another, usually from eighteen to twenty feet. The form of the beams is seen in the section shown in the engraving. The ends rest in chairs, which are cast upon the upper side of the girder. The form and position of these chairs, and the manner in which the ends of the beams rest in them, is also shown in the engraving.

In building the arches, the bricks were not laid in mortar, but were placed in their positions dry, and then grouted with hydraulic cement.* For this purpose, water-tight centres were made to support the bricks below while the arch was in process of building, and then the grouting was poured between the bricks. When the arches were completed, the spandrels were filled up with concrete to the level of the crown of the arch, and then a floor of narrow yellow-pine plank, one inch and a quarter thick, was laid over the whole. The planks of the floor are tongued and grooved together,

* Grouting is the process of pouring liquid mortar into a mass of masonry previously laid dry, so as to fill the interstices, and to cement the whole into one solid mass.

The floors.

Object of the plank lining.

Great weight on the floors.

and blind-nailed, in the best manner, to strips of wood laid previously in the concrete. The ends of these strips are seen in the drawing, by the side of the ends of the iron beams. They are dovetailed into the concrete, to prevent the possibility of their rising.

The floors are thus lined with wood, with a view to the health and comfort of the persons employed in the establishment. A wooden surface is found to be much more convenient and agreeable to the tread than any that can be formed of masonry or metal. A surface of brick or stone, too, by keeping the feet cold, exerts an injurious influence on the health, and makes the persons who use it, especially if they sit much at their work, always uncomfortable. These plank floors may, indeed, be considered as a wooden carpet laid over the brick floors.

It was necessary that the floors for an edifice destined to such purposes as this should possess great strength. In one room, for example, the floor is loaded with a weight of *one hundred and fifty tons of presses*. In the paper-room the weight is still greater, there being sometimes nearly twenty tons of paper on a space ten feet square. Paper, when lying in compact masses, is exceedingly heavy. It weighs about thirty-five pounds to the cubic foot. The floors, however, are calculated to bear a burden of from three hundred to five hundred pounds to the *square* foot; that is, they would be probably safe for five hundred, but are absolutely certain for three hundred. This would allow of covering the floor all over with stacks of paper ten feet high, or to fill the room full of men as close as they could stand, *in three or four tiers, one over the*

Statistics of the fire-proof flooring.

Manufacture of the beams.

other. Indeed, some engineers have considered that the construction has been made unnecessarily strong.

I was somewhat surprised, on making a calculation with the architect, at the statistics of this fire-proof flooring. The number of cast iron columns and girders—similar to those shown in the drawing of the counting-room—in both parts of the edifice, is over two hundred and fifty. This, too, does not include the eighty exterior columns in the front of the building on Franklin Square. The number of brick arches, averaging about four feet span, and fifteen feet in length from girder to girder, with wrought iron beams to support them, is about two thousand, and the whole area of floors thus supported in the different stories is between two and three acres. Let a farmer in the country select from among his fields a two and a half acre lot, and imagine the whole surface of it floored over, at a height of twelve feet above the ground, with a series of brick arches, supported by two hundred and fifty cast iron columns below, and covered above with a very close and compact yellow-pine floor, and he will have some idea of the magnitude of the scale on which this vast structure is planned.

CHAPTER III.

MANUFACTURE OF THE IRON BEAMS.

THE construction of the floors described in the preceding chapter, by means of wrought iron beams, and by light segmental arches thrown from beam to beam, is a very important feature in the construction of these edifices. It is novel also, these edifices

Great loss of property by fire.Essential requisites of a beam.

being the first in which the principle has been thoroughly tested. The nature and character of these beams, therefore, and the mode by which they are manufactured, deserves especial notice, particularly on account of the economy which they are the means of introducing in the structure of fire-proof buildings, both in respect to the cost, and to the space which the floors occupy.

It is no new thing to build a fire-proof structure, but it is a new thing to build one at a cost which places this desirable result within the means of all who build in large cities. It is estimated that the loss by conflagrations in the United States amounted to twenty-five millions of dollars during the year 1854. This sum would easily pay the interest on the extra cost of making fire-proof all the structures in the country in the manner here described. Besides, the mere loss in dollars does not cover the disastrous consequences of this vast destruction of property. The domestic misery and moral degradation which inevitably result from such sudden and overwhelming calamities are beyond pecuniary estimate.

Iron was early proposed as a substitute for the arches or masonry originally employed, because it could be placed horizontally, like wooden beams, and would cost less than the stone-work. In a beam, however, the essential requisite is that it shall be *stiff* enough to sustain the load. To secure this quality, the beams must be of a depth proportioned to the width of the space they are to cover. For all ordinary purposes, this requisite involves great weight of iron in each beam. It is well known that many tons of cast iron can be melted and formed into a single piece:

Use of cast iron.

Use of wrought iron.

Advantages of the latter.

but cast iron is comparatively too weak to resist a transverse strain, which is the peculiar strain produced on a beam by a loaded floor. To be perfectly secure, then, with east iron, it was necessary to use a much larger quantity of material than would be required of wrought iron. The cost was thus increased to such an extent as to confine the use of such beams to a really limited sphere. Besides, cast iron is liable to flaws, a single one of which might endanger the safety of an entire building. It also has another peculiarity, namely, that by being repeatedly loaded and released from its load, some internal change is produced in the texture of the iron, which weakens it, so that it has less power each time to resist the strain than before; and hence, in floors subjected to great intermitting strains, the ultimate failure of the east iron beams is certain, if the loads approach nearly to the measure of the strength of the material. The total destruction of some large buildings and bridges in England led to the investigation of the cause, and to the establishment of the facts above stated.

Attention was next turned to wrought iron. Wrought iron has all the properties necessary for a beam in far greater perfection than cast iron. It does not break suddenly, but, when *overstrained*, gives notice of the approaching failure by slowly bending. It is much stronger than any other material to resist a transverse strain, and therefore may be made proportionately light, thus saving weight in the walls and foundations of the building, and head-room in the respective stories. Patient experiments were made to determine the best form in which to distribute the material. The highest mathematical knowledge and skill were required to determ-

Flanged beams of wrought iron proved to be the best.

ine the laws which governed the strains upon wrought iron, and it is one of the proudest triumphs of modern science that a few short months only were required to determine finally and forever, on scientific principles, the laws of construction for cast and wrought iron, which the blind experiments of centuries before had failed to discover.

For building purposes, it was finally settled that flanged* beams of wrought iron are most desirable when the requisites of strength, lightness, and convenience of application are considered. This point being determined, it was necessary to devise the best mode of producing beams in this material. Two modes of working wrought iron are known, one by hammering it, the other by *rolling* it into the required shape. Hammering is an expensive operation, and is found to make the beams too costly for use. Flanged beams of the requisite weight had never been rolled. In fact, the whole process of rolling iron is comparatively new. It was invented by Cort in the last century, who, by his invention of the puddling process as well, did more than any other man, except Watt, for modern industry, and was rewarded with poverty in his lifetime, and is now almost forgotten in the grave. To him is due the manufacture of iron at a cost which enables it to be used with such profusion in the mechanic arts, thus greatly cheapening all the artificial necessities of civilized life.

The difficulty of heating and handling heavy masses of iron,

* A flange upon a beam is a flat projection extending from end to end of it. A good example of a flange is seen in the projecting rim of a rail-road wheel, which serves to keep the wheel from running off the track.

Riveted beams.

Expense of them.

The Trenton Iron Company.

though a very serious one at first, was nevertheless overcome long before any practicable process could be devised for making bars deep enough, with flanges broad enough, to answer for spanning any considerable distance between walls. Hence, to use wrought iron at all, it became necessary to rivet separate pieces together into the shape of a flanged bar. But, as separate pieces are never as strong as a single piece, and as the rivet-holes necessarily diminish the strength of the material, it becomes necessary to use more iron, besides expending great labor in fastening the pieces together. This made the beams expensive, and, although fire-proofing now became practicable, and free from most of the objections which could be urged against the other modes, it was still too costly for ordinary purposes, owing to the complex character of the beams.

The desideratum was therefore to make a solid rolled flanged beam of the right shape and proportions, and of the weight required for the spans ordinarily adopted in the buildings of large cities. The method of rolling such flanged beams was finally brought into successful operation at the iron-works of the Trenton Iron Company, situated in Trenton, N. J. The difficulties to be overcome in contriving and constructing the necessary machinery were very great. The mass of iron required for each beam, and which has, of course, to be pressed through the rollers at almost a white heat, is enormously heavy. Then the difficulty of constructing the rollers so that the iron, in passing through between them, shall have formed upon it flanges so wide as are necessary for beams, was very serious. We can not here describe the means

William Borrow.

His death.

Value of his invention.

by which at length the end was attained.* The arrangement was invented by a young Englishman named William Borrow. He was a relative of the author of *Lavengro* and of the Bible in Spain. Mr. Peter Cooper, under whose general charge the operation was conducted, was specially interested in the work, from the desire to employ such beams for the purpose of making fire-proof the large edifice which he was then erecting in New York for the Scientific Institution. He calculated that he should be able to put up the machinery in four months, and at an expense of about thirty thousand dollars.

The difficulties were, however, found to be far greater than had been foreseen. Instead of four months, it was two years before the machinery was brought into successful operation, and the cost of it, instead of thirty, was a hundred and fifty thousand dollars. And when at length the machinery was made to work successfully, the designer, Mr. Borrow, suddenly became ill, and died within a week, from the prostration of all his energies, mental and physical—a martyr to the difficulties which beset the practical workers of the world, whose story is seldom told, and who die without odes or funeral orations to celebrate their triumph or to honor their memory. And yet it is very likely to prove in the end that William Borrow has been one of the benefactors of his race. His invention will probably save millions of property from destruction—will ward off sorrow and calamity from innumerable hearths and

* The process of rolling out these immense bars of glowing iron forms a very magnificent spectacle. It can be witnessed at any time by visiting the works at Trenton, which are always readily shown to strangers.

The Harpers' decision to adopt the wrought-iron beam.

homes; and, by the preserving of capital from destruction, give vigor to great industrial enterprises in many future years.

It was just about the time that the machinery for rolling these beams was brought to perfection that the Messrs. Harper were making arrangements for the erection of the new buildings for their establishment, and, after giving the subject a careful consideration, they determined to adopt them. The result has been triumphantly successful, and this mode of building is now likely to be extensively adopted. After a full and careful examination of the subject by the government, it has been decided to adopt the plan in all the custom-houses and other public edifices in the United States.

A wrought iron beam of this principle seems a very simple thing, both in its structure and in its functions, and yet it is surprising what a vast combination of means and instrumentalities is necessary, and on what a prodigious scale the work must be performed, in order to produce such beams with sufficient economy to make the invention of practical value to society. It has already been stated that a solid wrought iron beam might be made by hammering, but that its cost, if thus manufactured, would be too great to allow of its use. The expense would, however, in this case, be incurred in the *process of manufacturing* rather than in the *original outlay* for machinery. An outlay of twenty-five thousand or thirty thousand dollars would enable solid hammered beams to be made, but then the expense of the process of manufacturing would bring the cost to ten or twelve cents per pound. Rolled beams are made at five or six cents per pound, or about one half

Great investment of capital required in the manufacture.

the above rate. But then the expenditure of capital required in the first instance, in order to effect this reduction, is enormous. In the first place, in order to make iron cheaply, the works must be on a large scale. This precludes the use of charcoal as a fuel, because it can not be got in quantities sufficiently large for great works without soon driving the woodchopper to a distance from the works so great as to destroy the value of the coal by the expense of hauling it. Mineral coal must therefore be used, and some site of manufacture must be selected to which both ore and coal can be conveniently brought in large quantities. Then extensive blast furnaces must be erected for the conversion of the ore into pig metal, and a forge built for turning the pig metal into wrought iron by the processes of puddling* and rolling.

The works of the Trenton Iron Company are upon the smallest scale which will combine all these processes in an economical manner, and yet the total expenditure for mines, furnaces, mills, water and steam power, in establishing them, is about one million of dollars. The number of hands employed directly are about two thousand, and the labor of all these is essential to make a single beam at six cents per pound. Besides this, the coal-mines must be opened and operated on an extensive scale, in order to produce coal cheaply. At least a million more is essential for this purpose; for, although the iron-works do not take all the coal, yet, if the mines were not operated extensively, the coal would not be cheap enough to enable the manufacturer to make beams cheaply.

* Puddling is a peculiar process by which cast iron is converted into wrought iron by means of passing it between rollers at a great heat.

Subsidiary agencies required.

Future progress of manufacturing arts.

Then the coal and ore must be got to the works. This is accomplished by the Lehigh Canal and the Morris Canal, which have cost some twelve or fifteen millions of dollars, and are maintained by a large annual expenditure. Then the pig iron must be transported to the mill over works that have cost two millions of dollars more; and, finally, the beams must be brought to New York either by the Delaware and Raritan Canal, or by the Camden and Amboy Rail-road—works which have cost some ten millions of dollars more, thus making essential for the production of a single rolled beam at six cents per pound, instead of a hammered one at ten cents per pound, an investment of from twenty-six to thirty millions of dollars, which, though of use for countless other purposes, is still essential for this purpose; for if a single link in the chain were wanting, the extra cost would more than cover all the difference between the hammering and the rolling of iron.

This simple statement will serve to explain why the comforts and luxuries of life are made accessible to all ranks by modern industry, while only two hundred or three hundred years ago they were confined to a very small portion of the community. Whenever any article can be made on a scale sufficiently large to take advantage of the best method, it can be cheaply made; when but little is required, the cost must be great. Hence, in the progress of society, manufactured articles will be brought within the means of all when all require them.

The sectional view of the edifice.The basement story.

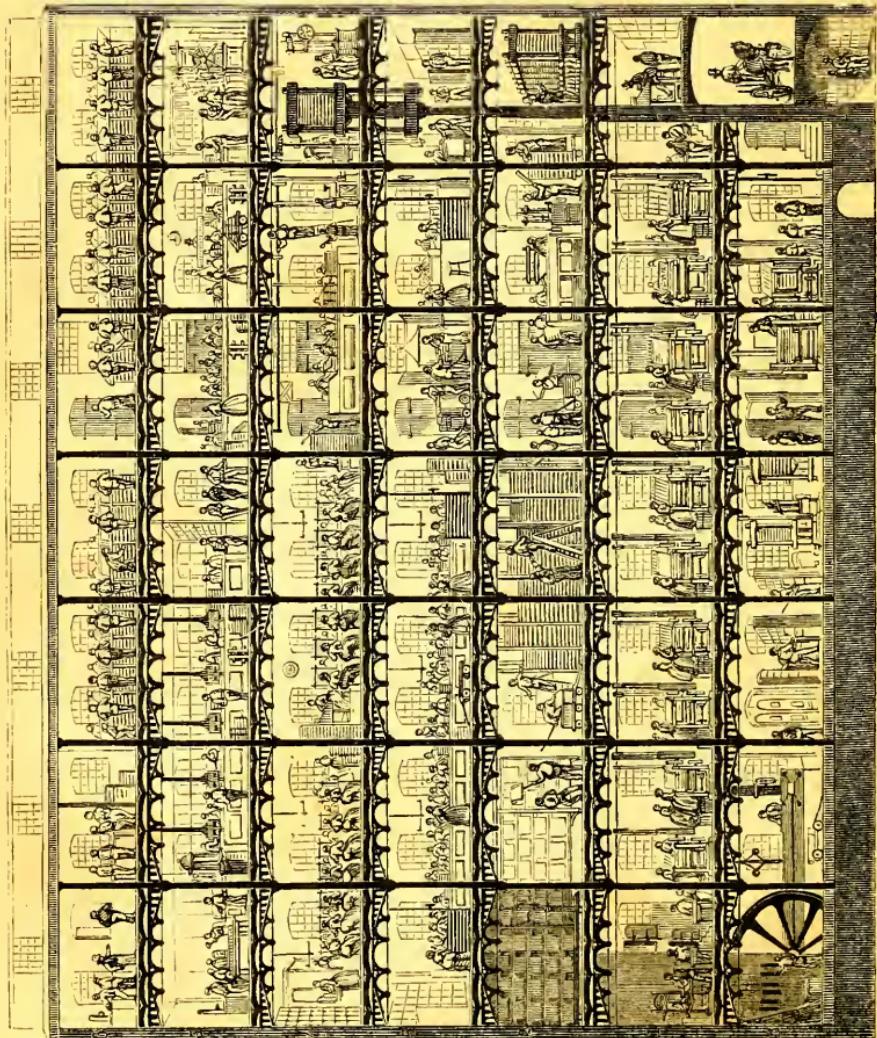
CHAPTER IV.

INTERIOR OF THE CLIFF STREET BUILDING.

THE edifice on Franklin Square is mainly devoted, as has already been explained, to the purpose of storing paper and books, and the various other supplies of stock and materials used in the establishment, while the processes of manufacture are carried on altogether in the Cliff Street building. In order to give the reader a distinct idea of the arrangement of this building, and of the manner in which the different floors are appropriated to their several uses, the artist has drawn a sectional view of the edifice, representing at one view the whole interior of it. By turning over the leaf this engraving will be seen. It represents the seven floors of the building, with the operations which are performed in each. I propose, in this chapter, to take, with the reader, a cursory survey of the whole, with a view of afterward considering the several operations by themselves, one by one, and describing them in full detail.

The lowermost story seen in the section is the basement. At the extremity of it, on the left, we see parts of the engine and machinery which supply moving power for all the operations of the establishment. This power is conveyed to the different floors by a system of axles, pulleys, and bands, extending from story to story. The main work which this engine has to perform is the driving of the presses on the floor above.

Sectional view of the Cliff Street building.



Various objects seen in the basement story.

Farther toward the right, in the basement story, we see a door which leads to the boiler-room in the court-yard. Farther still, near the centre of the room, several hydraulic standing-presses are seen, and also, still farther to the right, some printing-presses. The principal use of this lower room is to receive the paper from the store-room in the Franklin Square building, and prepare it to be put upon the printing-presses in the room above. It requires to be pressed in the standing-presses in order to make it smooth, and to be damped that it may take the ink properly from the impression. Of course, only a very small portion of the operations performed in this room can be shown in a section like this. The room is, in fact, more than sixty feet wide from front to back, while the section shows only a single line of operations from left to right through the centre of it. At the very extremity of the room on the right, we see a door which leads to the subterranean vaults, where the electrotypes and stereotype plates are stored. Still farther to the right, beyond the partition wall at the end of the room, we see a horse and cart coming from the court through the arched passage-way, and directly beneath is a section of one of the vaults, with two men going into it by the light of a lantern.

The first story above the basement, which is the principal or first story of the building, is the great press-room. This is the room which is represented in the ground plan on page 21. There we saw the position of the presses on the floor; here, on the other hand, we have a front elevation of one tier of them. There are three tiers, ten in each tier, except two spaces opposite the doors, making twenty-eight in all. The weight of these presses is about

The presses in the press-room.

The feeders.

Preparing the forms.

five tons each, making ten tons for the two which stand between each two of the columns. The distribution of these columns, and the arrangement of the girders and arches on each of the floors, is very distinctly seen in this sectional drawing.

We observe that each of the presses is attended by a girl, who stands upon a raised platform by the side of it. Her duty is to *feed* the press with paper, placing one sheet at a time. The sheet is thrown over when it is printed by what is called the *fly*, which is a light wooden frame, like a hand with a multitude of straight slender fingers, which lifts the sheet when it has received the impression, and throws it over upon the pile formed by those which had been printed before. At the right-hand end of the room this *fly* may be seen very distinctly in the act of going back after another sheet of paper, and on the other presses along the line we see it in various positions, bringing the printed sheet over.

At the extreme end of the press-room, toward the right, we see two men standing at a table. They are preparing a form for the press. This is a very important operation, and will be, hereafter, more fully described. Near them is a flight of steps leading up to an elevated compartment directly over the passage into the court-yard, where we see the horse and cart coming out. This is the office of the foreman of the press-room. Over his desk is a large opening, through which he can survey his whole dominion, and observe the action of all the presses and machinery. The men who are employed in preparing the forms for the press are directly beneath this window.

At the other end of the press-room, namely, at the extreme left,

The drying and pressing room.Apparatus for drying.

is a hand-press, used for working off hand-bills, circulars, and for other small operations.

We now pass to the next story above, which is called the drying and pressing-room. The printed sheets, as fast as they are taken from the presses below, are brought to this room through the hoistway in the court-yard. The entrance to this hoistway is seen opposite the third press in the press-room, counting from the right toward the left. It is a wide opening closed by double doors, and directly above it, in each story, is a similar opening leading to the hoistway. In one of the stories the doors are open.

The range of doors leading to the staircase in the tower is a little to the left of the openings leading to the hoistway. The doors leading to the staircase are narrower, it will be seen, than those of the hoistway. All the other openings in all the stories are windows.

But let us return to the drying and pressing-room. At the extreme right, over the office of the foreman of the press-room, is a range of hydraulic presses, where the sheets are pressed after being printed. They are, however, dried before they are pressed. This drying operation is performed at the other extremity of the room, namely, on the left. There is a compartment inclosed here which is kept constantly heated by steam-pipes, with a system of large frames, like horses for drying clothes, which can be drawn in and out. We see the compartment in the engraving in the first division of this room on the left, that is, in the part between the wall and the first tier of pillars. Between the first and second tier of pillars we see two of the frames out. One of them is already filled

The hydraulic presses.

Piles of pressed paper ready to be folded.

with sheets of paper, and the workman is in the act of pushing it in to the heated compartment, in order that the sheets may be dried there. The other frame is not yet ready to go in; a workman is employed in putting sheets upon it by means of a pole with a cross-bar at the top, as seen in the engraving.

When the sheets are dry, they are taken on trucks—one of which is seen standing near—to the other extremity of the room, to be pressed in the hydraulic presses. An enlarged view and a more full description, both of the drying apparatus and of the hydraulic presses, will be given in a subsequent chapter.

The hydraulic *engine*, by which the pressure is applied to the sheets and the presses, is represented in the engraving, though I am not certain that the reader will be able to find it. It stands in the division of the room which comes between the first and second columns, reckoning from the right. It stands near a window, a little to the left of where two men are at work piling up a stack of paper to go into one of the hydraulic presses. To the left of the hydraulic engine is a range of tables—only one of which, however, is seen in the engraving—where the sheets are prepared to go into the presses, and arranged when they come out. The operation, which is quite a curious one, will be more fully described hereafter.

In the centre of the room are to be seen, stacked up in large racks, a number of great piles of sheets of paper that have been pressed and dried, and are now ready to be folded for the binder. These stacks are some of them so high that, in order to put on the uppermost sheets, the men are obliged to mount upon ladders, as

Folding-room.

Gas fixtures.

Warming apparatus.

seen in the engraving, and the weight is very great which comes upon the girders and beams of the floor below.

The next story above, namely, the third above the basement, is called the folding-room. The principal operation performed in it is that of folding the sheets of paper after they are pressed, and preparing them to be stitched or sewed. The work of folding is performed by girls, who sit at long tables arranged in the room for this purpose. One range of these tables, with the girls at their work, is seen represented in the engraving, occupying the left half of the apartment. Gas fixtures, at proper distances, are suspended over the table for evening work in winter. Similar burners are to be seen in various other parts of the building.

Near each end of this table is to be seen an apparatus presenting the appearance of a frame of parallel bars, rising to a height of two or three feet above the floor. These are sets of steam-pipes, by which the apartment is warmed. Similar sets of pipes are seen in various other places on the different floors.

At the time of folding the sheets, it is necessary to insert, in their proper places, between the leaves, all such engravings as have been printed separately from the body of the work. The case of shelves seen at the end of the apartment, on the left, near the end of the table, is used to contain supplies of these engravings, arranged for use.

The doors leading to the hoistway are represented open on this story, and some men are in the act of drawing in a load of printed sheets from the platform. A part of the machinery of the elevator is seen through the opening.

The hydraulic presses.

The pump.

Long tables.

Clock.

To the right of the hoistway door, in the fourth story, near the right-hand end of the apartment, is seen a massive structure, forming a base for the support of heavy presses in the room above. These are hydraulic presses of great weight, and a special support was accordingly provided for them, consisting of extra columns in the second and third stories, resting on a very thick wall coming up from the stories below. These presses are used for pressing the folded sheets, so as to bring them together into a compact form, ready for sawing the backs and binding them. There are two of these presses in fact, though only one of them is shown in the section. The hydraulic pump by which the pressure is applied is seen to the right of the press, near the end of the room. A little to the left of the press is a small machine called a sawing machine, which will hereafter be more fully explained. The man on the ladder, to the left of the sawing machine, is engaged in making some adjustment of the machinery that runs along from end to end of the room, under the ceiling, to supply motive power to the various engines in the apartment. The remainder of this apartment is occupied by girls seated at long tables, and employed in the work of sewing or stitching the sheets. A clock is seen hanging upon the wall, opposite the centre of the tables. A little to the left of the clock is the desk of the man who superintends these operations.

The next story, that is, the fifth above the basement, is called the FINISHING-ROOM. The various operations performed in this room will be described in detail hereafter. The foreman is seen sitting at a desk, on an elevated platform, in the last division but

Great number of presses.	Marbling.	Finishing-room.
one toward the right. We see the clock on the wall behind him. Before him are a large number of men engaged in what is called <i>forwarding</i> the books—that is, preparing and fitting the covers, pasting down the fly-leaves, trimming the edges, and performing other such processes preparatory to the stamping and gilding. On the extreme right is a row of standing-presses, used for pressing the books after they are sewed and put together, this making the fourth time in which the books, or the materials of which they are composed, have been subjected to pressure in the different stages of the manufacture. The number of presses required for all these varied operations is not less than twenty-five. Of printing-presses—all massive machines of great power, and driven by steam—there are thirty-three in the principal press-room and in the story below.		

In the back corner of this apartment, toward the right, is an inclosure for the process of marbling. Other portions of the room, toward the left, are also inclosed for different processes of finishing work. In the first division on the left, we see the men engaged in sprinkling the backs of the books for the purpose of producing the mottled appearance often seen on the backs of the covers of books bound in leather. The second and third divisions of this apartment are occupied by a room in which gilding and other finishing processes are performed. We observe a number of small furnaces on the table. In these the irons for gilding are heated. The fire is made by flames of gas.

This brings us to the upper story, which is the great composing-room of the establishment—that is, the room where the types are

The court-yard.

Chimney.

Staircase tower.

Hoistway.

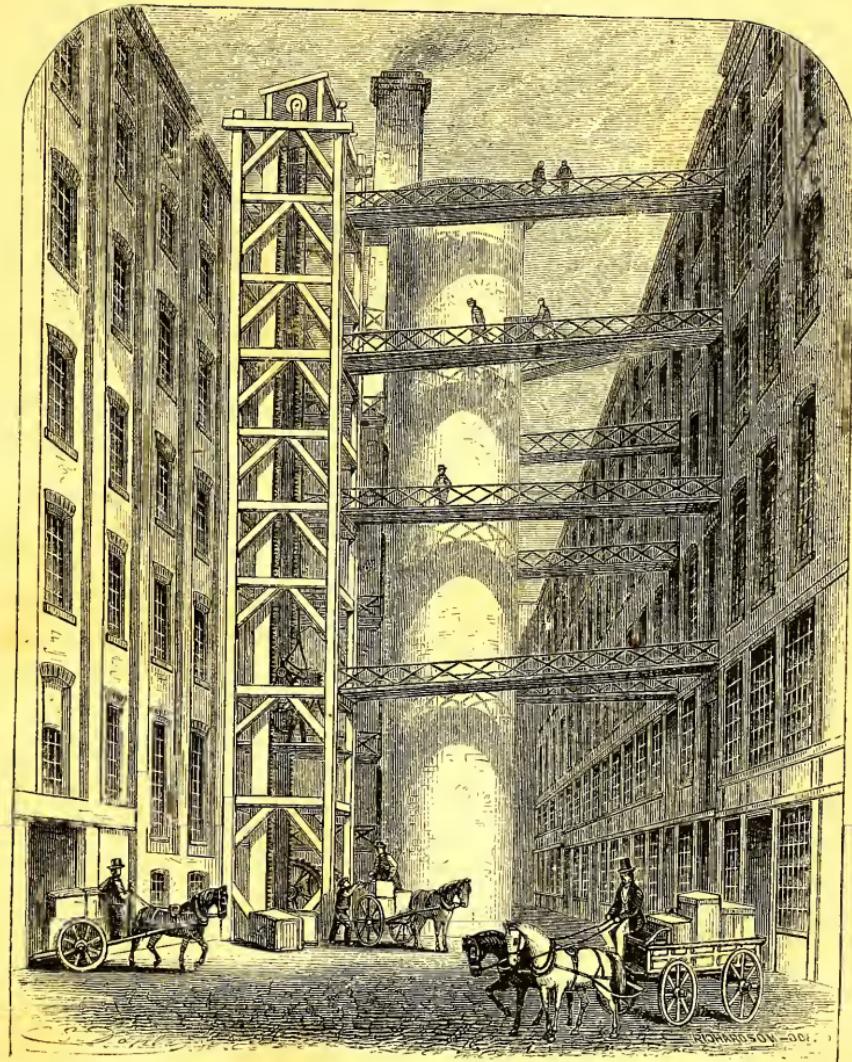
set, as will be hereafter explained. The electrotyping operations are also performed here.

Having thus given a general view of the arrangement of the Cliff Street building, and a summary account of the several operations performed in it, we shall now proceed to consider some of the most important of these operations in detail, beginning with composition, which is the first step in the complicated process of printing a book. We have first, however, in order that we may fully complete our general survey of the buildings themselves, to take a view of the interior of the court-yard.

CHAPTER V.

THE COURT-YARD.

THE two edifices of the Harper Establishment, fronting respectively on Cliff Street and Franklin Square, are separated from each other by a court-yard. This court-yard is about twenty-eight feet wide, and extends the whole length of the buildings. It contains, near the centre, three principal constructions: 1. The great chimney of the establishment; 2. The brick tower inclosing the circular staircase; and, 3. The hoistway, by which the various supplies of materials and books in the different stages of manufacture are conveyed up and down to the several stories, as required. Numerous iron bridges, connecting the different stories of the two buildings with the hoistway and the tower, pass across this court, and form one of the most striking features of it. A view of the whole is presented in the engraving on the opposite page.



INTERIOR OF THE COURT-YARD.

RICHARDSON - 1801

Entrance to the courtyard.

The machinery of the hoistway.

The entrance to the court is by an arched passage-way leading from Cliff Street. A cart is represented in the engraving as coming in. The hoistway is the framed structure on the left, as seen in the engraving. It extends from the ground to some distance above the topmost story of the Cliff Street building. There is within it a movable platform, which rises and falls from top to bottom. This platform is worked by machinery connected with the steam-engine, which is placed in the court beyond the tower. This machinery acts upon the platform by means of a cable which passes over a pulley at the top of the hoistway. This pulley may be seen in the engraving, with a roof above it to protect it and the rope from the rain.

The platform itself is represented in the engraving as near the bottom of the hoistway, with a man standing upon it, whose business it is to raise and lower it, in conveying goods up and down. He controls the motions of it by means of levers placed within his reach on the platform. One of these levers communicates with the steam-engine; the other with a brake which encircles a friction-wheel, and, when in action, retards the descent. This mechanism can not be here fully described in its details. It is sufficient to say that, by the management of these levers, the man in charge can cause the platform to ascend or descend at will, with himself and all its burden upon it. He can make it move as fast or as slow as he pleases, and by means of a ratchet-wheel connected with the mechanism, can lock it at any moment wherever he wishes it to stop. He can place it in this manner opposite the doors leading to any of the various stories of the Cliff Street building, or to

The iron bridges in the court-yard.

Glass roof over the boilers.

the bridges leading to the Franklin Square building. When the platform is so placed, the floor of it forms a continuous surface with the floor of the bridge or of the doorway, as the case may be, and thus the trucks containing the books or the paper, or whatever else it may be, that is to be transported up or down, can be drawn directly upon it.

The hoistway is six feet square, and as the breadth of the court is twenty-eight feet, it leaves twenty-two for the length of the bridges leading from it to the Franklin Square building. The bridges leading from the tower are not so long, the tower being situated nearer the centre of the court.

Some of the bridges are level, others are more or less inclined, owing to the different relative heights of the several stories of the two buildings.

The tower itself is ten feet in diameter outside, and eight within. It contains a spiral staircase of iron, with landings opposite the bridges leading to the several stories of the two buildings. The chimney, which is seen rising like a monument to some distance above the roof, is the only portion of the original establishment not destroyed by the fire. It presented a singular spectacle, rising above the blackened ruins which lay smouldering around.

All that part of the court-yard which lies beyond the tower is roofed over with glass. This roof is shown more distinctly in the plan on page 51. The inclosure contains the boilers of the steam-engine. The boilers are placed thus in the court-yard for the double purpose of security against fire, and to prevent any damage to the buildings themselves from an explosion.

The windows.

Question of iron shutters.

Composition.

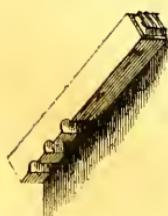
The windows that open upon this court, as well as all the exterior windows of the buildings, are framed and sashed with iron, and are of very large size. Those of the principal floors are each six feet wide by twelve feet high. The average size of all the windows in the building is four feet by nine, and the whole number of windows is four hundred and thirty-four. Portions of each sash are made to move on pivots for ventilation.

It was thought best not to apply iron shutters to the windows opening into this court, as the communication of fire across the court, by the burning of the materials in any room of either building, to the opposite room in the other, is deemed all but impossible; and the iron shutters, if applied, would operate to prevent the breaking out of a fire from being so soon observed by the watchman, in case the accident should occur.

CHAPTER VI.

COMPOSITION.

THE printer's type, notwithstanding the wonders that it performs, and the vast influence which it exerts on the welfare and destiny of man, is in itself a very simple little thing. It is a small, short metallic bar, with the form of the letter which it is intended to print cast on one end of it. This engraving represents a type of the letter *m*, of the natural size—that is, of one of the natural sizes, for, of course, the



TYPE OF A LETTER.

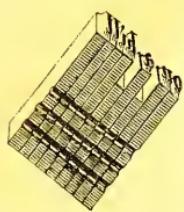
Great number and variety of types.

The composing-stick.

breadth and thickness of the little bar varies according to the size of the intended letter, though the length is always the same, being made to conform to a common standard.

Besides letters, there are types for commas, periods, quotation marks, and all other characters used in printing. There are also

shorter pieces of metal, which are put in between the words, where a little space is required to separate them. These are called *spaces* themselves. You see them represented in the annexed engraving.



Of course, the forms of the letters are reversed on the types, but they come right in the printing. They come right, too, by being reflected, as you will see by holding up the page containing the preceding engraving before a mirror. When types are arranged in this way, so as to form the words that are to be printed, they are said to be *set up*, and the work of setting them up is called *composing* or *composition*.*

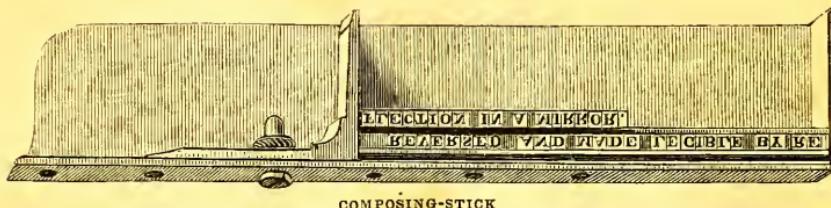
In arranging his types, the compositor has a little iron frame to set them up in, which is large enough to hold from twelve to twenty lines at a time. This instrument is called a composing-stick.

* The word *compose* means strictly *to place together*. In writing composition in a school, the writer arranges and puts together words and ideas to form sentences and a continued discourse, while the printer's composition is the arranging and putting together of letters to form words and sentences. So also the putting together of musical notes, in such a way as that, when they are played or sung, they will form a tune, is called *musical composition*; and, when different substances are mixed together to make a compound, the result is often termed a *composition*.

Setting type.

Plan and arrangement of the cases.

The following engraving represents the form of a composing-stick.



In setting up the type in the composing-stick, the compositor stands at what is called the case. The case is a broad and shallow box, divided into a number of compartments by means of thin partitions. Each compartment is filled with the types of one particular letter or character.

There are, in fact, two of these cases before each compositor. One lies directly before him, on a stand, and is placed in a sloping position, like the top of a desk. The other is farther back, and is more nearly upright. The position of both is represented in the adjoining engraving.



THE CASE.

The first mentioned of these cases is called the *lower case*.

The other is the *upper* one. The upper case contains the capitals,

Construction of the different compartments.

Comparative number of letters.

small capitals, foot-note marks, dashes, &c., and the lower one the small letters, points, figures, double letters, and spaces. These, being the types most in use, are placed in the case nearest to the hand of the workman.

Below are drawers containing Italic letters, and other sorts still less frequently employed.

In respect to the compartments of the cases, there are two things particularly to be observed: one is, that they vary much in size, and the other is, that the letters are not placed in them at all in alphabetical order. Some letters occur much more frequently in our language than others. The letter *e*, for example, is much more common than any other; the printer consequently requires a much larger supply of *e*'s than of the rest, and he wishes, too, to have them near at hand; whereas the letters *j*, and *k*, and *x*, occur very unfrequently. Quite a small compartment, therefore, will answer for them, and it may be placed, moreover, a little farther away. The case is planned, in a word, with reference to having the letters most frequently in use provided with the largest compartments, and also to having them nearest to the compositor's hand.

You can easily prove to your own satisfaction how much more numerous some letters are than others in our language, by counting the number of those of the same kind in any sentence in a book. If you take any sentence of four or five lines, you will be sure to find many more *e*'s than any other letter, and very few *j*'s, *k*'s, *x*'s, *z*'s, and *q*'s. You will find a considerable number of *t*'s and *a*'s—about three quarters as many as of the *e*'s. Of *c*'s you will find about *one* quarter as many, while of *z*'s you will

The art of deciphering.

Curious method by counting the characters.

only find one for every sixty *e*'s. Indeed, the proportion of the various letters in all English writing is much more regular than one would have supposed, so that it may be made quite a subject of calculation.

A very curious use of this principle is made in what is called the art of deciphering. In time of war, when letters containing orders, or any important intelligence, are sent from one officer to another, under circumstances in which it is probable that they might fall into the hands of the enemy, it is customary to write them in cipher, as it is called, that is, in secret characters; and when such letters are seized by the other party, it is a great art to decipher them. Now if the cipher, that is, the secret mode of writing, consists only of using, instead of each letter of the alphabet, some other letter or character in its place, the work of deciphering is very easy. You have only to count the number of times in which the several letters or characters occur in the writing, and the work is almost done at once. The character which has the highest number is of course *e*, and the others follow in almost regular order. There are a number of other curious methods and contrivances which assist in identifying the various letters and characters, that I have not time here to explain; such as if the character which stands for *e* comes at the end of a word of three letters several times, the other two letters are probably *t* and *h*; and also, if any word of a single letter occurs in the course of the writing, it must be either *a* or *I*, as only those letters make single words in common use in our language. By these and a few other similar principles, a number of the characters are soon ascer-

Exceptions to the general rule.

How the compositor sets the type.

tained, and every one that is thus ascertained helps very much to disclose the next. Indeed, this mode of writing is so easily deciphered that it is now never used ; other much more difficult methods take its place.

It must not, however, be supposed, from what has been said, that the proportion of the different letters as they occur in different books is by any means entirely uniform. If a writer of a tale, for example, were to choose such a name as Zizine for the heroine of it, the compositor, in setting it up, would very soon get out of z's. Something like this, substantially, continually occurs ; that is, the subject or character of a work may be such as to occasion the frequent recurrence of particular words, and this brings the letters which are contained in that word into unusual demand ; so that different books *run*, as the compositors express it, upon different letters. Still, the general principle is true.

But let us return to the compositor at his case.

He does not look at the face of the type to see what letter it is when he takes it up and sets it in the composing-stick, but takes it for granted, if it comes from the right compartment, it is the right letter. He has not time to look at it more than to give it a slight glance to see that he puts it into the composing-stick right end up and right side to. He is assisted in this by what are called the *nicks* on the side of the type, which are small notches made on the side which is to be turned outward when the type is set in the composing-stick. It is much easier to set the type right by a glance at these notches, which are very conspicuous, than to look

Facilities for composing.

Measuring by ems.

An hour's work.

at the letter on the face of it, and see which is the top and which is the bottom of it, for this, in the case of some of the letters particularly, as, for example, the *o* and the *s*, would require very close attention.

Thus every possible arrangement is made to facilitate the work of the compositor, and enable him to get the types up as rapidly as possible from the several compartments, and to place them with the least delay in the right position in the composing-stick. By means of these facilities—that is, by having the types that are most frequently used placed nearest at hand, and having them all marked so that they may be placed in the right position at a glance—a good compositor can proceed very rapidly with his work. He has every inducement to learn to work fast, for he is paid, not by the time, but by the quantity of work which he accomplishes. The number of pages that he sets up are measured from time to time, and the amount entered on a schedule; then, at the end of the week or fortnight, he is paid according to what he has done. The unit or standard of measurement for the work is the type of the letter *m*; that type being exactly square in its form, it is easy to measure by it, for there will always be as many *ems* in a line as there are lines in a space up and down the page equal to the length of the line.

To set up a thousand ems in an hour is considered pretty good work, though some compositors will set up fifteen hundred. To do this, however, the man must be all the time on the alert, and the motions both of his eye and his hand must be very quick indeed; for we must remember that, in a thousand ems, there are

Number of types on an average in a thousand ems.

many more than one thousand types to be handled, since a great many of the types, the letter *i* for example, and the comma, and the period, and the spaces, are so thin that it would take several of them to make an *m*. I learn that, upon an average, there are about three times as many types in a page as the number of ems which measure it. If this is so, a man, in order to set up a thousand ems in an hour, has to take up and place three thousand different pieces of metal. And when we consider that he has to select all these separate pieces from a great many different compartments, not less than one hundred and forty in all, some of them almost as far off from him as he can reach, and that he must place every one in just such a position in the composing-stick, and must then *justify* the line—that is, must adjust it exactly to the allotted length, it is plain that his movements must be very active to enable him to place three thousand of them in an hour.

There is a great difference in different men in respect to their natural capacity to make quick compositors. This difference does not depend altogether on their mental qualities, such as their energy, industry, and attention, but much, also, on the physical constitution of the nerves and muscles of the eye and the arm. There is a difference analogous to this in the action of certain musical instruments, such as the piano or the organ. Some respond quicker to the touch than others, on account of nice and delicate differences in the interior mechanism; that is, the connection of the series of effects, whatever they are, which intervene between the touch of the key and the production of the sound, in some instruments, is such that the process is run through with great rapidity,

Rapid composers.	Requisites.	Number of motions to be made.
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and the sound follows the touch almost in an instant. In others it is more slow. On instruments of the former kind, very rapid music can be played; on the latter, only slow music, for you can go with the succession of notes no faster than the sounds can be produced after touching the keys; in other words, you can go no faster than the nature of the instrument allows. They may be excellent instruments notwithstanding—that is, they may be excellent for the kind of music they are adapted to. They may be richer in tone, and more perfect in every respect than the others except the single one of speed.

It is in some measure so with the nerves and muscles of the arm. When the compositor takes into his eye, from the copy which lies before him on the upper case, any particular sentence or word, quite a long nervous and muscular process has to be gone through before the types representing the word find their places in the composing-stick. His mind first separates the word into its letters. His eye must then point out the several compartments, one after another, where the letters are to be found. His hand must move to them, and as he brings each type in toward the stick, his eye must glance at it for an instant to catch the position of the nicks, and to direct the hand in respect to the manner in which the type has to be turned, and then must be off again in an instant to find the compartment which the next letter is to come from, in order to be ready to direct the hand there the instant that the first type is placed. Then, in turning the type over, and bringing it in a right position into its place in the stick, several separate motions of many different fingers are necessary,

Franklin amusing himself in his old age with composing.

each of which requires a distinct volition of the mind, and a distinct transmission of orders down the nerves of the arm. In a word, the whole process, quick as a skillful compositor is in the performance of it, is extremely complicated in its nature, and it can only be performed at the rate of over a thousand ems the hour by men whose nervous and muscular machinery is in the most perfect possible condition. There are many men who, though they may be excellently-well qualified for a hundred other things, can only make slow music in composing.



FRANKLIN.

Still, to those who perform it well, it is an easy and an agreeable occupation. The famous philosopher and statesman, Benjamin Franklin, who was a printer in early life, was accustomed, in his old age, to amuse himself with setting types and printing with his own hand, in the use of a small and convenient apparatus made expressly for the purpose.

The success of a compositor, however, does not by any means depend altogether on these physical advantages. In this, as in all other labors, they who are intent on their work, who are diligent and persevere, and who give their thoughts closely to what they are doing, and are systematic,

regular, and careful, so as to make the setting right, as nearly as

Errors.

Justifying.

The lines must be all of equal length.

possible, the first time, always, in the end, win the day over the brilliant geniuses who dash on carelessly, right or wrong, and afterward lose a great deal of their time in correcting errors; for every compositor has his own work to correct. I will now describe how this is done.

As he goes on setting up the type in the composing-stick, he places a short type at the end of every word to make the space which, on the printed page, is to separate one word from another. When he gets to the end of a line, if the work comes right, very well; if not, he makes it right by widening or narrowing the intervals between the words by means of very thin *spaces*, kept for the purpose. This process of filling out the lines is called *justifying*. It takes about a quarter as much time to justify the line as it does to pick up and place the letters of which it is composed. While justifying the line, the eye of the compositor usually runs along the line, and detects most of the errors that may have been made, and then corrects them before he proceeds. It is, of course, necessary that every line of type should fill the whole breadth of the page or column exactly, so that when the page or column is wedged up, the types of every line may be held tight in their places by the pressure of their neighbors. If the line is a broken one, as, for instance, one at the end of a paragraph, then the whole remaining space is filled up with pieces of metal similar to those placed between the words, only of much larger size. All this may be seen plainly represented in the specimen which is set up in the composing-stick on page 56. The compositor proceeds, thus setting up line after line in his compos-

The rule.	The galley.	Pi.	The chase.
ing-stick, until the stick is full. In order to keep the line that he is at work upon separate from the rest, and to facilitate the motion of the types in sliding into their places, he has a small tin or brass plate, called a rule, which he takes out from behind each line as soon as the line is completed, and places it above, so as to make a smooth floor, as it were, to set the new line upon. With this rule, too, he takes up the whole mass of type when the composing-stick is full, and places it away on what is called a galley.			

The galley is an oblong board, with a margin about half an inch high on two sides of it, to keep the types that are placed on it from falling down. It requires great skill and dexterity, however, to handle the types when set, and to transfer them from the composing-stick to the galleys, and to move them about there, in the work of forming them into pages, and such other operations. With practice, the compositors acquire great dexterity in these manipulations, and, to the eye of the observer, they move the masses of type about as if they were so many solid blocks of metal. Sometimes, however, an accident happens; a mass of type falls upon the floor, and of course becomes a perfectly confused melange. This is called *pi*.

When the galleys are full, the *matter*, as the mass of type set up is called, is formed into pages, and placed in a frame called a *chase* to be proved. A chase is a frame of iron, divided into compartments like the sash of a window. Each compartment is intended to contain one or more pages of type, and the frame is made of iron, with strong bars crossing each other to form the compartments, in order that each page of type may be wedged in very

Furniture and quoins.

Young Franklin carrying the forms.

firmly, so as to hold every type securely in its place. To do this, they place small wooden bars along the sides and ends of each page, and then drive wedges in between these bars and the iron sides of the compartment in which the page is placed. Of course the compartments of the chase are made larger than the page or pages intended to be put in them, in order to afford room for these bars and wedges. The printers call these bars *furniture*; the wedges are called *quoins*.



FORMS

The pages of type are wedged up so firmly in the chase as to form, as it were, one solid and compact mass, which can be carried from place to place with perfect safety. In former times, when it was more the custom than it is now to print directly from types, these forms had often to be carried to and fro between the composing-room and the press-room. The engraving represents Benjamin Franklin, when a journeymen printer, carrying two of them at the same time, to show the

other workmen that, though he drank no strong drink, he possessed as much muscular strength as any of them.

The custom of printing from standing type is not wholly discontinued, by any means, at the present day. All newspapers, and many books, are still printed directly from the types. We often see these forms now, even in the street, as they are being conveyed from the composing-rooms, where the types have been set up and made ready, to the great printing-offices where they are to be worked on the immense presses of modern times, driven by steam. These forms, made up of the types themselves, are very massive and heavy, and there is great inconvenience in printing from them.

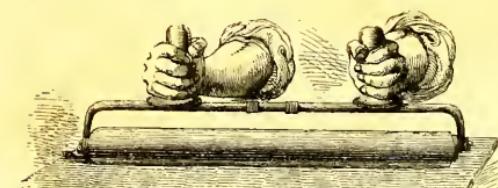
In order to avoid printing directly from the types, *stereotyping* was for a long time in use. This consisted in taking a mould in plaster of Paris from each page of type, and then pouring melted type-metal into the mould, thus producing a perfect cast of the surface of the page, and the printing was done from these stereotype plates. Recently, however, an improvement called *electrotyping* has been introduced.

In the Harper Establishment almost every thing at present is electrotyped. The pages of types are therefore only locked up in small chases containing one to four pages each, for the electrotyping process. The first thing is, however, to make them correct; for, notwithstanding all possible care on the part of the compositor, many of the types in every page will be found, on the first trial, to be wrong. In order to correct the errors, the form containing the page to be produced is placed upon a small hand-press, and an impression is taken. The types are inked by means

The roller for inking.

Balls.

Composition of the rollers.



THE ROLLER.*

in the above engraving.

The ink is taken up by the roller from a sort of table that stands near. This ink is not liquid, like writing-ink, but is thick and viscid, like pitch; and a small quantity of it is taken up by the roller from the table, where it has been previously spread out evenly and thin, and is thence transferred to the faces of the types. In former times, balls were used for the purpose of inking the type. These balls were of the form represented in the adjoining engraving. The workman distributed the ink evenly over the balls by working and rolling the faces of them together by means of the handles attached to them, and then he would apply the ink from them to the faces of the types in the same manner. This, however, was a very laborious and slow operation, and the invention of the roller has greatly facilitated the process of inking the type. In the great

* These rollers are made of a composition of glue and molasses, boiled together, and then cast in iron moulds, made perfectly smooth inside. In the centre of the mould is a wooden core passing through from end to end, with iron pivots in the extremities of it, which, when the roller is finished, becomes the spindle on which it revolves.



THE BALLS.

of a roller covered with ink, which the workman rolls back and forth over the pages. The form of this roller and the manner of its operation are seen

The inking.

The hand-press.

Errors in composition.

power-presses now in general use in all the great printing establishments, there is a system of these rollers incorporated in the machinery, so that the types of the largest forms are inked without any manual labor whatever. This will be explained more fully by-and-by.

CHAPTER VII.

PROOFS AND CORRECTING.

THE proof, that is, the first impression from the type, made to enable the proof-reader to examine his work, and to mark the necessary corrections, is taken, as has already been said, on a small press, in contradistinction from the power-presses that are worked by steam and machinery. One or more of these hand-presses stand in the composing-room for the purpose of taking proofs. A view of one of them is given on page 116, where it will be fully described. The impression is taken on a small sheet—a quantity of such sheets, previously dampened, being always ready at hand for this purpose. The best proofs contain some errors, and most proofs many. Words are misspelled by the accidental substitution of one letter for another; spaces are omitted; now and then a letter is wrong side up; and perhaps a period or a note of interrogation, instead of taking its place properly at the end of the sentence, has intruded into the middle of a word. It would, I have no doubt, amuse those of my readers who have never seen a proof, if I were to insert a specimen here, with all its errors, just as they appear when the first impression is taken; but if I were to pro-

Marks for correcting proofs.

Correcting the errors.

pose to do such a thing, I presume there is not a printer in the Harper Establishment who would not be shocked at the idea of allowing any matter in such a state to go out into the world at all, on the pages of such a work as this, even as a curiosity.

When the proof has been taken, the proof-reader examines it carefully, and marks all the errors. Printers have a peculiar set of marks for the purpose of calling the attention of the compositor to the several errors, and to direct him how they are to be corrected. The compositor takes the form containing the pages of type which are to be corrected to a sort of high table, which is of a very solid and substantial construction, and there, after having loosened the pages by driving back the wedges by which they were "locked up," he proceeds to make the corrections by taking out the types that were wrong, and putting in right ones in their place. In pulling up the types that are to come out, he uses a sort of bodkin or awl, with a sharp point. This he presses against the side of the type that is to come up, and thus draws it out, and then puts the right one in its place. When the errors consist simply of wrong letters, the corrections are easily made; but if he has omitted any word, or has inserted any not found in the copy, it is more difficult to manage them. If the word to be put in is short, he can sometimes do it by taking out the spaces between the words and putting in thinner ones, thus making room for the new word. So he may sometimes take out a small superfluous word, and fill out the line by putting in thicker spaces. When there are very wide spaces between the words in any line, it is usually because the compositor has taken out a word in this way.

Reading the proof by copy.

Distributing the type.

But he is not allowed to make the spacing so wide as to injure the appearance of the page. If he can not get in or take out the word in this way, he has to *overrun* the matter, as it is called; that is, to carry forward one or more words from each line to the next, down to the end of the paragraph. When the corrections are all made, the pages are locked up again, and are then returned to the press, in order that a new proof may be taken.

The process of proving the work is repeated several times before it is found to be quite correct. Once it is read over carefully "by copy," as it is called, that is, by the manuscript; and finally, after it seems to be right, it is sent to the author, that he may give it a final revision. If he has made his manuscript correct in the first instance, and if the compositor and proof-reader have done their work properly, his revise will come back with very few marks upon it. The final corrections, however, which the author directs, having been made, the pages are ready to be sent to the electro-typing-room, in order that a copper fac simile of the face of it may be formed in a thin plate, for more convenient handling. When this is done, the pages of type are returned to the compositor who set them up, in order to be distributed.

The process of distributing the type—that is, of putting back the letters in the several compartments of the case where they belong, seems very surprising to those who first witness it, on account of the great rapidity with which it is performed. The compositor takes up a number of lines of type on his rule, having previously wet the whole page. This wetting causes the types to adhere together slightly, and makes it much more easy to manipulate them.

Importance of correct distribution.

Bad management of authors.

The compositor proceeds to take up several words at a time, and then, by a very dexterous motion, he throws off the several letters into their various compartments, moving his hand for this purpose with astonishing rapidity, to and fro, all about the case. A compositor will distribute five or six times faster than he can compose.

The success of the compositor, in all his work, depends very much indeed upon the correctness of his distribution; for, of course, if he has wrong type in any compartment, those type will come up when he is setting, and fill his proof with errors. It is very seldom that he sees the face of a type when he is composing; he can not stop to identify the letter in that way; he only looks at the compartment from which it comes, and at the nicks in the side of it, in order to know in what position to place it. Of course, the correctness of his composition is greatly dependent upon the correctness of his distribution.

There is a great difference in different compositors in respect to the accuracy of their work. Some proceed with so much system and care, that the whole amount of correcting which their work requires is not more than an hour or two a week. Others have to lose as much time or more every day. This, of course, is so much deducted from their earnings, since compositors are only paid for the amount of *corrected* work that they do.

Authors often unconsciously add to the labors of the compositor by inconsiderate management of various kinds, especially by making additions and alterations to their writing in the *proof*, so that, after the compositor has once set up the work, and taken a

Follow copy.

Two good rules for young authors.

great deal of pains, by two or three corrections, to get it precisely according to the copy, and then sends a proof to the author to see if it is right, it comes back marked with numerous changes, and thus the work has all to be done, as it were, over again. It would seem, sometimes, that the author makes use of the first labors of the compositor merely to obtain a fair copy of the manuscript, in order that he may more conveniently correct and improve it. The compositor, however, receives pay for making any alterations from copy. He keeps an account of the time so employed, and charges for them. This is, of course, no more than right, as his proper business is merely to "follow copy."

There are two rules to be strictly observed by all persons who write any thing for the press :

1. Finish the writing of your book or article before you begin the printing of it. In other words, make the copy perfect, just as you wish the work to appear, before you put it into the printer's hands, so that, if possible, no alterations whatever may be required after it is once in type.

2. In preparing the copy which you intend for the compositor, write only on one side of the sheet of paper, and write in a plain, distinct, and legible hand, every word in full, and all the paragraphs, divisions, headings, and stops, and other marks, just as you wish them to appear. The compositor's rule is to conform to the copy precisely in all these particulars. Indeed, the rule which Benjamin Franklin gave to the journeymen in his office, and which is, in some sense, the rule of all good compositors to the present day, was, Follow your copy, if you follow it out of the window.

Type-founding.

Visit to a foundry.

Conversation with the proprietor.

It unfortunately happens that some authors are so careless with their manuscripts, that, in following this rule when setting up for them, the poor compositor gets sent, as it were, out of the window very often.

CHAPTER VIII.

TYPE-FOUNDRY.

I HAD often heard that the making of types was an exceedingly ingenious and curious process, and when I had finished the foregoing description of the manner in which these little wonder-workers are set up, it occurred to my mind that it would be a good plan for me to visit one of the principal foundries in New York, and see for myself how the work of manufacturing them was performed. I accordingly called upon the Messrs. Harper, and asked one of the gentlemen for the address of one of the foundries from which they obtained their supplies. He accordingly gave me the address, and I immediately proceeded to the type-founding establishment. One of the proprietors received me very kindly, and conducted me through the rooms to witness the different processes.

“In former times,” said he, as we walked together up stairs in going to the upper stories of the building, where the various operations of the manufactory were carried on, “in former times, it was customary to cast types in little moulds held in the hand, the melted metal being poured in from a small ladle, but now they are made far more rapidly by means of a machine.”

He also explained to me the composition and the properties of

Qualities of good type metal.Composition of it.

the metal used for the casting. It seems that it must possess the following properties: It must be *hard*, but not too *brittle*. It must also be easily fused, and not subject to rust.

It must be hard; for, if it were soft, like lead, the face of the type would not stand under the great pressure required in printing, and the edges of the letter, too, would be battered and bruised from the little knocks which the types necessarily get from each other in the processes of being set up and distributed.

For a similar reason, it must not be brittle, for then the edges would break and crumble.

It must be easily fusible. Iron, for example, does not melt at less than a red heat, and it would be extremely difficult, if not impossible, to manage such small castings at so great a temperature.

It must be a metal, too, not subject to rust; for, in using the types, it is often necessary to wet them, and thus, if they were made of any easily oxydizable metal, they would soon become rusted and spoiled.* For this reason, therefore, as well as for the other, iron would not answer for types.

In fact, there is no one simple metal that is suitable. There is some good and valid objection to every one. The type-makers have, however, discovered a compound of three metals which answers the purpose very well. The three metals are lead, tin, and

* When iron rusts, the metal combines at the surface with one of the components of water, called *oxygen*. This compound of iron and oxygen forms the brown powder which we call *rust*. *Lead*, when thus combined with oxygen, forms a *white* powder, and sometimes a *red* powder. But lead will not combine with the oxygen by simple exposure to the atmosphere, or contact with water, as iron will. Lead, therefore, is said not to be easily oxydizable.

Examination of a specimen.

The casting-room.

Pin machine.

antimony. Neither of them by itself would make a good type, but, combined together in certain proportions, they form just the material that is required. The compound melts easily, and it becomes hard, but not brittle, when cold. Then there is another point which is of great importance, namely, that it does not shrink much in cooling. If the metal were to shrink in cooling, then the face of the type would lose its fullness and sharpness of form, and thus become more or less imperfect and irregular.

While the proprietor of the foundry was explaining these things to me on the way up stairs, he stopped at a little office in one of the rooms to show me some specimens of type metal. He cut some of these with a knife, to let me see how hard and tough the metal was. It seemed to be harder than lead, but not nearly so hard as copper.

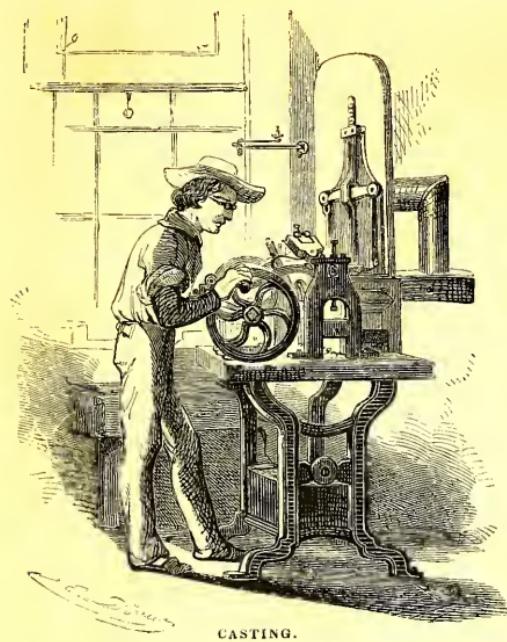
Soon after this we entered the casting-room, which was in the upper story of the building. There was a range of workmen all around the room, each busy casting type at his little machine. The machines had each its own separate furnace and reservoir of metal, so that they looked like so many little forges ranged in order all about the room.

We walked up toward one of the machines that stood near a window, to witness the operation of it. I was greatly astonished at the spectacle. I have seen very ingenious mechanical contrivances before—those for making pins, for example—where a coil of wire is drawn in at one end of the machine, and pins drop out of the other almost as fast as you can count them. But this seemed more surprising still, for it was a mass of hot, melted metal, bub-

Operation of the type machine.

The mould.

Operation of it.



ple of its operation, as is usually the case, indeed, with all great inventions, was very simple. The essential thing is a mould to cast the types in, made in parts, so as to open for the purpose of letting the type drop out, and then to shut up together again very closely and exactly. The several parts forming the mould are so connected with machinery worked by the crank that they are opened and shut again every time the crank is turned once round.

Besides this action of opening and shutting the mould, with all

bling and simmering, as it were, over its little furnaces that supplied the material. By the simple turning of a crank on the part of the operator, as a boy would turn a small grindstone or a coffee-mill, this melted metal was taken up, a little at a time, at the upper part of the machine, and dropped out in types below, cool and solid.

But I must describe the machine a little more particularly. It appeared to be complicated in its construction, but the prin-

The little force-pump.

Types caught by an apron.

the complicated mechanism which is connected with it, it has another movement. Every time the crank revolves, it is brought up to what might be called the mouth of the furnace, to receive the supply of melted metal, and then is brought away again. This mouth is very small, the orifice not being much larger, perhaps, than a large pin-hole. At the instant the mouth of the mould is brought up in contact with this little opening by the moving of the crank, a jet of melted metal, just enough to fill the mould, is forced in by means of a small force-pump in the reservoir. This force-pump is worked by the same crank which gives motion to the mould. In a word, the machine is so contrived that the operator, by simply turning this crank, brings up the mould to the furnace, pumps in enough of metal for the casting of one type, withdraws the mould, opens it to let the type drop out, and then puts the mould together again for a fresh operation.

The types, though cool enough to be solid when they drop, are still very hot. They are caught, therefore, as they fall, upon a little paper apron under the machine, and thence, cooling as they go, they are gradually shaken down by the types that continue to fall upon the apron from above, and finally descend into a box placed a little below to receive them.

The operation was performed with astonishing rapidity. I took out my watch while standing near one of the fastest of the machines, in order to see how rapidly the types were produced by it. I found that thirty-six types were dropped in a quarter of a minute, or over eight thousand in an hour. It is true that this machine was casting small type, and that it worked faster than most

- Duties of the type-founder.

- Great care requisite.

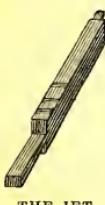
- The jet.

others in the room. The average, however, could not have been less than two thousand in an hour.

It is by no means to be supposed, however, that because the operation of the machine thus described seems so simple, the artisan who works it has nothing to do but to turn a crank. This is, indeed, all the mechanical work that he has to perform, but in the exercise of judgment, skill, and discretion, he has a great deal to do. He must watch his furnace and his reservoir of melted metal, to see that the metal is always of the proper temperature. He must be careful, too, that he does not turn the machine too fast, for this would heat the mould too much, and thus prevent the perfect form of the type. He must continually keep his eye on the little orifice where the metal is ejected from the reservoir, to see that all is right there, and that no little globules of melted metal remain on the outside of it to prevent a perfect junction of the face of the mould with the outside surface. In a word, a person, to be a good type-founder, notwithstanding all the help he obtains from his machine, must be a man of great skill, careful judgment, and practical dexterity.

The metal, in being injected or forced into the mould, passes through an opening, which forms a sort of long, slender funnel,

which enters at the lower end of the mould. This funnel itself, as well as the mould, becomes filled with metal, so that, when the type drops upon the paper below this metal remains attached to it in the form of a long and slender wedge-shaped projection called a *jet*, which is represented in the adjoining engraving. This jet



Process of breaking.

Very rapid and dexterous performance of it.

must, of course, be removed in the process of finishing the type. Indeed, the removing of it is the first step in the finishing proeess.

They *break* it off. It breaks very easily, being quite slender at the point of its junction with the type. One would not suppose that there would be any thing particularly curious or interesting in so simple an operation as this, but I found it quite curious, on account of the great rapidity with which the boys, whose business it is, perform it, and the arrangements which were made to facilitate the work. The proeess is called breaking, and the boys who do it are called *breakers*.

The breaker is seated, when at work, at a sort of low table, with sides all around it, to prevent the types from falling upon the floor. The eentre of the table directly before him is covered with a sort of cushion, or, rather, as perhaps I ought to say, the bottom of the box which the table forms is lined with a sort of cushion covered with smooth leather. At one end of the table, within the box, is a great pile of types, with the jets attached to them, just as they come from the moulds. These the boy continually draws down upon the surface of the eushion, where he breaks off the jets from them with an inconeeivably rapid motion of the fingers, and then separates the parts by pushing the jets one way and the types another. The boy whom I watched performed the operation so rapidly that, with the closest observation, I could not follow the motions of his fingers at all, or see by what means he contrived to accomplish the object.

Of course, at the point where the jet was broken off, the mark of the fraeture would remain at the end of the type, producing a

Rubbing.

Description of the stones.

Mould not perfectly tight.

sort of blemish. It was curious to see how simply and easily this mark was afterward removed. A long row of the types were set up together, side by side, in a long and slender frame, and then a little plane, the rim of which came almost to a point, and was ground at the end to the form of an exceedingly small gouge, was passed along the whole line, and thus, by a single stroke of the tool, the fractured portion was cut out from the ends of hundreds of types at a time.

The next process to breaking was what was called rubbing. The rubbing was the work of women and girls. The room where this operation was performed had two or three long low tables extending through it from end to end, with what seemed to be a row of grindstones lying upon them. These stones were large and not very thick, and they were lying on their sides upon the tables. The upper surface of them seemed to be very level and flat, and were of about the roughness of sand-paper. Before each stone sat a female operative rubbing types. The object of this rubbing was to smooth the sides of the type, and to remove a little thin projection of metal which is apt to be left, after the casting, at the edges. This projection is caused by the protrusion of the metal a little way into the joints of the mould; for the mould, you will recollect, is made of several distinct parts, which open after the casting, to allow the type to drop out, and then shut together again. Now it is not possible to make these joints perfectly tight, I suppose. Indeed, it is necessary to allow sufficient opening to permit the escape of the air, for the metal can not enter the mould any faster than the air which was previously in it can go out. Now

Account of the process of <i>rubbing</i> .	Setting.	Types placed in rows.
the metal itself, at the moment of casting, will protrude a little way into these interstices, and to remove the protrusions thus formed is one object of the rubbing.		

The girl takes up a handful of types, and lays them down, side by side, on the stone. She takes ten or twenty at a time. She then lays two of her fingers across the types, and, by a sweep of her arm to and fro, she rubs them back and forth on the flat surface of the stone. This smooths and evens the under sides of the types. Then she brings the types to the edge of the stone, so as to allow the ends of the whole row to project a little, and by a very dexterous movement—so dexterous and quick, indeed, that you will have to look very closely to follow it—she turns them all over together, and then proceeds to rub the other side, and finally pushes them into a box ready near the stone to receive them.

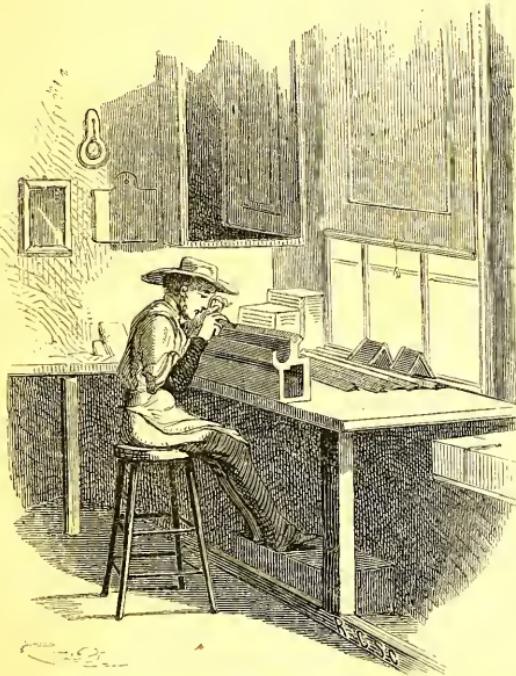
After a time, the stones, I was told, become glazed over, as it were, by the rubbing of the types upon them, and then it becomes necessary to restore the roughness of the surface before they can be used any more. This is done by grinding them with sand.

The next process is *setting*. This consists of the work of arranging the types in rows for inspection and for the final finishing. The setters are usually small girls. The types are taken up by them from a box, where they lie in bulk, and are placed in a row upon a long stick, like a yard-stick. It is astonishing to witness the rapidity of motion and the accuracy which these girls display in taking up and placing the types, arranging them all the same way, that is, with the same side toward them, and the letter faces all turned downward. In the first instance, the girls set the types

Picture of the *dresser* examining the types with a magnifying-glass.

in a shorter stick, much like a composing-stick in respect to the manner in which it is used, only it is eight or ten inches long, and just wide enough for one row of types. As fast as this stick becomes full, the girls transfer the row of types to the long stick, which lies on a little shelf before them, and when this is full the whole line is made ready to be passed into the hands of the dresser.

This brings us to the next operation, which is that of *dressing* the type. The dresser carefully examines them, and rejects those that are imperfect and bad, and then trims those that are perfect to an exact and a uniform standard. The casting, to be sure, leaves them nearly uniform, but not quite. It is the last finishing touch to form the types which the dresser gives to them. For this object, he arranges them on an instrument which has the appearance of a very long rule. There



THE DRESSER.

is a ledge below for the foot of the types to stand upon, and a sort

Very close examination required.

Rapid manipulations.

of chock at each end, one of which is movable, and works by a screw. By means of these, the types, when necessary, may be all clamped together. The dresser arranges his types in a line on this rule, and places them in a strong light at a table opposite the window. They stand there before him in a strong and glittering row, like a long line of soldiers waiting for inspection. Holding a little awl or bodkin in his right hand, and in his left, close to his eye, a small magnifying-glass, he passes his glass along the line, looking closely at the face of every type. All that are perfect he passes; but, whenever he sees any little blemish or imperfection on the surface of the metal which forms the face of the letter, he instantly pulls the type forward out from among its fellows with his bodkin, and it drops, condemned and disgraced, into an apron placed below to receive it, whence it is sent back in due time to the melting-pot, to try its chance again. As near as I could judge, something like one tenth of the types were thus condemned.

The types that pass inspection are then screwed up together to receive their final trimming, the dresser maneuvering and manipulating them for this purpose with surprising dexterity, causing them to change front, face about, and turn, now this side toward him and now that, all together, with an adroitness that would astonish the most skillful general that ever maneuvered soldiers on parade.

It is in the course of this process of dressing that the workman planes out the mark of the fracture left at the foot of the type by breaking off the jet, as has before been explained.

Types packed for sale.

Modern improvements in the art of printing

Moulds.

When the dressing process has been completed, the types are finished. They are then set up together solid, in square blocks of about the size of one of these pages, those of the same letter or character together. These blocks are then carefully enveloped and packed, and are ready for sale.

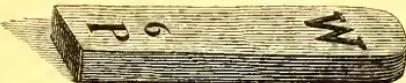
The quantity of metal thus cast into types at the establishment that I visited amounts to not less than 500,000 pounds every year, and nearly two hundred hands are constantly employed in the various processes. This fact alone shows on how magnificent a scale the printing operations of the present day are conducted. One of the results of the progress which the printing art has thus made is, that more copies of the Bible are now printed in two years than the whole number that had ever been printed before the commencement of the present century since the art of printing was discovered.

It is very probable that in respect to the printing of books and newspapers the advance has been greater still.

CHAPTER IX.

MOULDS FOR TYPE-FOUNDRY.

THE process of forming the types themselves from the melted metal, nice and curious as it is, is by no means the most delicate and difficult part of the type-founder's work. The great thing is the making of the mould, or, rather, of that part of the mould by which the face of the letter is formed. The part in question is called the *matrice*, because it is the mother, as it were, of all the

Picture of a matrice.	Description of it.	The punches.
	types that are cast in it. The matrice is a short and thick bar or block of copper, with the form of the letter which it is intended	

to produce from it stamped in one of the four sides of it, near the end. It is about as long as a type, but a great deal broader and thicker. Of course, there must be a separate matrice for every separate letter or character. The matrices are all of the same length, and are so made that any of them that belong to the same set can be inserted into any mould, though the letters and characters which are stamped upon them are of course different in each different matrice.

In every machine or mould for casting type there is a place for inserting the matrice, and the founder can put in any one he pleases, according to the type or character which he wishes to cast. The matrice is so placed in the mould that the part on which the letter is stamped comes exactly opposite the head of the type, and thus the metal, at the moment of casting, flows into the stamped depression, and forms the letter that is stamped upon the matrice, whatever it may be.

Thus we see very easily how the letters are formed on the types by means of the impression in the matrice, but now the question arises how the impressions in the matrices are made. The answer is, that they are stamped in the copper by means of what are called *punches*. By examining the engraving on the following page, the reader will be able to form a pretty correct opinion of how punches are made.

Mode of making the punches.	Drives.	Complicated process.
  THE PUNCHES.	The punch consists of a small steel rod, with a letter cut upon one end, and a flat head, to receive the blow of a hammer, at the other. The punches are about two or three inches long, and are made of the best and hardest steel.	

steel. The letter is cut upon them by hand, in the use of chisels, files, and other such instruments; and as the form and fashion of all the impressions in the matrices, and of all the castings on the types, and of all the letters in the printed books which may come from them, depend upon their shape and finish, the utmost possible pains is taken in perfecting them.

The letters are formed in the matrice by means of the punch, the letter end of it being driven into the copper by the blow of a hammer. A man who owns a set of punches often sells a set of impressions from them to a type-founder, to save the founder the expense of making the punches himself. He calls it selling *drives*.

Thus, in coming to the punches, we come at last to the point where the form of the letter has its actual origin. It begins with the punch, the punch makes the matrice, the matrice makes the type, and the type makes the electrotype, and the electrotype makes the letter on the printed page. Thus every letter which you see in this book has come to you through all these five different forms.

This seems, at first view, to be taking a great deal of trouble; but, on reflection, we shall see that the process is admirably calcu-

Advantages of the system.

Immense multiplication of results.

lated to save labor and trouble. If, for example, every type were formed by itself, by cutting out the letter upon the end of it with chisels and files, instead of casting it in a matrice, the work of forming them would be pretty much the same as that of making the punches—a day's labor nearly to each one; whereas now they are cast, as we have seen, at the rate of from two thousand to eight thousand in an hour. So in respect to the matrices. To form a matrice by means of cutting-tools would be even more laborious and troublesome than the making of a punch, and there would be only one matrice when it was done. But the punch, once finished, is the means of making hundreds of matrices, each being formed at a blow.

The effect of the whole system in respect to the multiplication of results is amazing, as will be readily seen by the following calculation: One punch will make from fifty to one hundred matrices. These matrices, distributed in the various machines of many different founders, will cast each many millions of types, making many hundreds of millions of types from one punch. Each of these types used in electrotyping will give from five hundred to one thousand electrotype copies, and every electrotype used in printing will give a million of impressions on a printed page. This makes an aggregate of many *thousands of millions of millions* of printed letters from one single father punch, the common progenitor of all. This is no imaginary or fanciful calculation. It is a fair and honest statement of the actual powers of the system as now in constant operation, and it is in consequence of this enormous multiplication of results that the art of printing is enabled

Care in making the punches.

Great number and variety required.

to perform such wonders, and to exert such an influence as it does on the destinies of man.

Of course, a punch that is to exert so wide-spread an influence in the world well deserves that no pains or expense should be spared in giving it, at the outset, the most perfect possible form. Consequently, the cutting and the polishing of the punches is one of the most delicate and important of all the processes connected with the typographical art. The punches are, consequently, very costly, and a good set of them is highly prized. A very large number, too, are required in every extensive foundry. One might at first suppose that a few hundred would be enough, as there are only twenty-four letters in the alphabet, and a comparatively small number of stops and marks besides. But, instead of a few hundreds, many thousands are required. In the first place, there must be two sets of capitals, and one set each for Roman and Italic letters, and one set for figures, for every size of type. These, with the necessary stops and other characters, make at least three hundred punches for every size. Then the number of sizes and styles of letters in ordinary use is very large, so that there is scarcely any limit to the number and variety of punches that are required. They amounted, in the establishment that I was visiting, to many thousands, and the value of them was from thirty to forty thousand dollars. The value of the matrices, too, was about the same.

I went to see the iron safes where this valuable property was deposited. These safes—which are the same with those customarily used by the New York merchants for keeping their account-

The safes where the punches and matrices are kept.

books and other valuables from thieves and fire—are great iron chests, made movable on monstrous castors, with walls eight or ten inches thick all around. These walls are formed inside and out of thick plates of iron, bolted together in the most substantial manner, and filled in with a mineral composition peculiarly adapted to resist the action of fire. The doors are of the same construction as the walls, and they move, of course, very slowly and heavily on their massive hinges.

The first safe that I visited contained punches, and the whole interior of it was filled with a system of small shallow drawers, each of which contained a number of round tin boxes, in which the punches were packed, those of the same size in the same box. They were packed in an upright position, with the letters on the upper end of them.

I afterward went to see the safes that contained the matrices. There were two of these safes, and they were much larger than the one which I had first visited, for the matrices are far more numerous than the punches. These safes, too, were filled with little drawers, all of which were appropriately numbered and labeled according to the denomination, style, and character of the letters which the matrices that they contained were intended to make. The contents of these safes were of very great value. In addition to the usual securities for the protection of them in case of fire, they were banded very strongly with thick bars of iron; made to close over the doors after they were shut, and to lock independently of them. The object of these bands was to assist in preventing the safe from bursting open when falling through the floors

Fall of heavy safes in case of fire.Great strength required.

of the building into the cellar in case of a fire; for always, when a building is burned that contains safes of this character in the upper stories, the safes, as soon as the timbers of the floor on which they stand are weakened by the fire, break through, and fall with a dreadful crash down through all the other floors into the cellar. Indeed, so great is the force of the fall of these safes sometimes, that they bring down the walls of the building with them, the ends of the floor-timbers being built into the walls in such a manner that when the timbers are broken off and borne down in the inside, the walls are pried over as by a lever, and come down with a dreadful crash and confusion into the street, overwhelming and burying the firemen, perhaps, in the ruin.

The safes of a type-foundry are peculiarly heavy, being filled, not with books and accounts, or other comparatively light articles, but with pieces of metal, which, though individually small, are so numerous, and so closely packed, that the whole safe, in respect to its heaviness, is very much as if it were one solid mass of iron six feet square and three feet deep. Of course, so ponderous a body as this, in falling fifty or sixty feet through the floors of a burning building, must come down to the cellar floor with a tremendous concussion, and there would be most imminent danger that it would burst itself open, unless its fastenings were secured in the strongest possible manner.

Indeed, the whole building used for the purposes of a type-foundry must be made extremely strong, on account of the great weight which almost every part of it has to carry. The packages of types, of course, as arranged on the shelves of the store-room, ready to be

Comparative quantities required of different letters.

boxed for their various destinations, are as heavy almost as so many blocks of solid metal. I saw one set of very strong and massive shelves, perhaps ten feet wide, and ten feet high in all, which contained packages of type that weighed, in all, I was informed, not less than ten tons. The whole solid stock of type on hand in the establishment weighed usually not less than forty or fifty tons.

In fitting up the types for use, those of each letter are put together in a package by itself, so that one package, when opened, is found to be all *a*'s, another all *b*'s, and so on. The reader might perhaps suppose, at first thought, that the number of types for each letter of the alphabet would be equal. But this is by no means the case, for some letters occur much more frequently than others, and, of course, more types of them are required in proportion than of the others.

For example, almost twice as many are required of the letter *e* as of any other letter, for the *e* occurs twice as frequently as any other letter of the alphabet in the English language. This subject has already been referred to in describing the setting of type. Next to the letter *e*, the letters *a*, *n*, and *o* are most common. For every seven pounds of *e*'s they usually put about four pounds of *a*'s, *n*'s, and *o*'s; that is, a little more than one half as many. The most unfrequent letters are *q*, *x*, and *z*. Of each of these only one quarter of a pound are required for every seven pounds of *e*'s, which is in the proportion of one to twenty-eight.

It is surprising what a variety of effects can be produced by type made in this way, from matrices formed by punches of steel.

Specimen of script type.

Great variety of punches made.

There is a style of type in which the letters seem to touch each other on the printed page, and form what appears to be a continuous writing.

*Mrs. A. accepts with pleasure Mrs.
B.'s kind invitation for Thursday.*

Monday morning

This is called script type. It looks quite continuous, like real writing; but if you examine it very closely, especially with a microscope, you will see a slight division in the hair-line which unites each letter with the one that precedes and follows it. These divisions denote the points of junction between the several types as they stand in the line.

A great many different styles of ornamental borders are made in the same way, that is, by means of separate types, the figure on each of which is carried out so close to the edge of it as to come almost into absolute contact with the corresponding parts of the figure on the next type. Thus, in the printing, the effect of a continuous border is produced. Type-founders invent an infinite variety of these borders, each differing from the rest in style and design. On the next page is a small specimen of one of them.

These borders are used to form ornamental margins for cards, certificates, catalogues, and other similar publications, and sometimes, too, for the pages of printed books. I insert a specimen

Farther specimens of what can be done by means of punches.

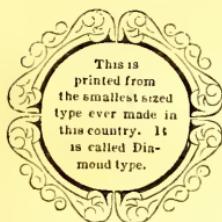


and exceedingly elaborate. Others are small and very delicate in style of execution, and by varying the combinations of them a

great variety of effects may be produced. In the margin is a small circle formed by arranging together the four corner types of a particular border, with a specimen of fine printing within it, which shows to how great a degree of minuteness the work of cutting the punches is sometimes carried.

And here I will close the account of this curious manufacture, only adding that the types made where the English language is spoken are by no means restricted to the English language in speaking themselves. They can talk in any language in which the alphabetic characters are the same as in our own. Thus the progeny of the same punch, formed by an American workman in New York, are scattered in innumerable thousands over the world.

here to show how great is the variety of work accomplished by the punch, and how nice must be the skill of the cutter to work such fine and complicated designs in the solid metal. Many of these borders are very large



Types can speak in many different languages.

They talk Spanish in Mexico, Portuguese in Brazil, and French in New Orleans or Montreal. They are employed, too, in every variety of duty. Some, in spelling-books or primers, are set to the work of teaching millions of little children in schools to read and spell. Others, that came out, perhaps, originally side by side with the former from the same matrice, are employed in Latin dictionaries, or in new and beautiful editions of the ancient classics, to aid the learned researches of scholars in colleges and universities. Some amuse in books of romance. Others, the brothers and sisters of the former, puzzle and perplex in books of mathematics. Some go to Washington, and make fierce political speeches, now in favor of one party, and now in favor of the other, equally indifferent to both; others to a Bible House or a Tract House, and earnestly plead the cause of human salvation; while others still devote their lives to the fireside entertainment and instruction of thousands of families through the pages of story-books or magazines. All this time the parent punch from whom they all sprung remains wholly unconscious of the immense diffusion of his offspring, and of the vastly varied character of the duties whieh they are severally called upon to fulfill. He pays no heed to these incalculable results of what he has already done, and least of all does he show any disposition to be satisfied with them. His duty is to go on producing; so he holds well to his temper and to his edge, and keeps steadily on, adding continually, through the new matrices that he produces, millions and millions more to his already innumerable progeny.

Advantages of the electrotyping process.

The plate.

CHAPTER X.

ELECTROTYPEING.

THE electrotyping process is one which has been discovered within a very few years, and it very greatly facilitates all printing operations which are carried on upon an extensive scale. It consists in producing from the solid page of types, or of types and engraved blocks together—which, of course, is very heavy and unwieldy—a plate of copper, with all the faces of the letters and the lines of the engravings precisely repeated on the side of it, just as they appear in the solid page which the compositor had set up. The original page of the types can then be sent back to the composing-room and distributed, and the new and comparatively light, thin copper plate can be used to print from in its stead.

The electrotype plate is about three sixteenths of an inch in thickness. In length and breadth, of course, it corresponds with the size of the page that it was made from. The face of it is of copper; the back of it, including the principal portion of its thickness, is of type-metal.

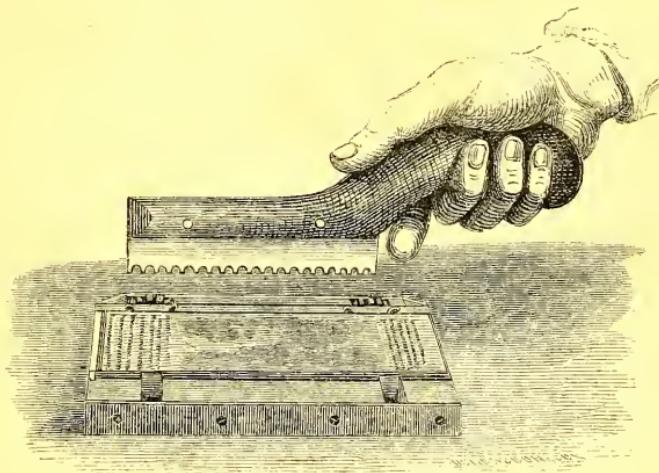
When it is to be used in printing, it is placed upon a block of wood of such a thickness that the block and the plate together shall equal the thickness of the original page of type. The block is provided with a pair of clamps to secure the plate in its place. The upper ends of these clamps are seen in the engraving, on the edge of the block that is toward us, projecting over the edge of the

Blocking electrotype plates.

The clamps.

Engraving of a block.

plate, which is beveled to receive them. The back edge of the plate is also beveled, and passes under two fixtures projecting on that side, which are attached firmly to the block. The clamps on the hither side are movable, being made so that they can be drawn back or driven forward by means of the toothed wheels, which are seen near the back edge of the block. These wheels are each con-



BLOCKING THE PLATE.

structed with a brass rod, which serves as an axle, and communicates with the clamps on the front side of the plate. The rods are connected with these clamps by a screw, so that, by turning the toothed wheels, the clamps may be drawn in over the edge of the plate, and thus made to hold it down securely on the face of the block. The other side of the plate is held down, of course, by the

How the thin copper plate is strengthened.

beveled edge being brought close under the fixed clamps on that side.

The instrument with which the toothed wheels are worked, both in fastening in the plate and loosening it again when required, is seen above, as held when in use by the workman.

The plate, as will be seen by the engraving, is quite thin. It shows on the upper surface a map, occupying the centre of the page, with a few lines of letter-press above and below. Of course, in forming this page, the wooden block on which the map was engraved was placed in the centre, and the lines of type, after being set up in the composing-stick, were placed at each end. The whole page was then wedged up in a chase, and sent to the electrotypewriter.

The upper surface of the electrotype only—that is, the one which contains the forms of the letters and the lines of the engraving, is of copper. The remainder of the thickness of it, as has already been said, is of type-metal, which is cast upon the back of the thin copper plate, to stiffen and support it. The chief interest in respect to the electrotyping process is the manner in which this thin copper plate is made.

A visitor going into a room where the electrotyping process is going on, sees little else but a large number of square boxes or tanks, filled with some chemical-looking liquor, and connected together by means of a great number of bent and crooked wires, which run in irregular curves from one tank to another. These wires are for the purpose of carrying an electric current to the liquor in the tanks. The current is supplied from what is called a galvanic battery, which also stands in the room.

Galvanic battery.

Singular effects of the current of electricity.

To describe the construction and uses of a galvanic battery would lead me too far away from the subject of printing. It will be sufficient for my present purpose to say, that a current of electricity from such a battery, directed upon the liquor in the tank, is essential to the success of the electrotyping process, and, accordingly, the battery and wires are arranged for the purpose of supplying such a current. The general principle on which the process is conducted is this.

It has been discovered within a few years that if a liquid contains any metal in solution, an arrangement may be made of electric wires, so that, under the influence of the electric current brought by the wires, the particles of the metal in the solution will be slowly deposited upon any metallic plate which may be immersed in the liquid, although no such effect would be produced without the electric current. For example, if a liquid containing copper in solution were to be placed in a tank, and a silver dollar were to be immersed in it, no effect would be produced.* If, now, a galvanic battery be established near the place, to supply a current of electricity, and wires are placed in a peculiar way, connecting the battery with the liquor in the tank, and also with the silver dollar, the copper will begin immediately to leave the liquor, and to deposit itself in a thin film all over the surface of the silver, and will soon encase it entirely. This process will go on as long

* Copper itself, in its metallic state, can not be dissolved in water; but some of its compounds with other substances can be. For example, *blue vitriol*, which is a compound of sulphuric acid and copper, is easily soluble. Of course, in a solution of *blue vitriol* in water, we should have the particles of copper diffused throughout the liquid, though in a wholly invisible form.

Formation of the mould.

Depositing the copper upon it.

as the current of electricity continues, and the supply of copper in the solution holds out. Thus a copper covering of any required thickness may be applied to the silver.

The process of electrotyping is conducted on this principle. A thin film of copper is deposited in the manner above described upon a mould which contains a perfect impression of the whole page which is to be cast, both type-matter and engravings. The mould is formed from the page as it is set up in the composing-room by pressing the face of it into a certain plastic substance prepared for the purpose. When the mould is thus formed, and the surface of it is prepared properly for receiving the metallic deposit, it is placed in one of the tanks, and then connected with the battery by the wires. The deposition of the copper all over the surface of the mould immediately commences. The particles find their way into all the interstices of the type, and into the very finest lines of the engraving, so as to reproduce exactly every touch and lineament, however delicate and fine, of the engraved work.

After the process has been continued several hours, until the workman considers that the coating of copper is sufficiently thick to sustain itself under the subsequent operations, he takes the mould out, and the copper coating is detached from it. The plate is exceedingly slender and thin when first detached, but all the letters of the types, and all the lines, and even the very finest shades of the engraving, are represented upon it with beautiful distinctness and precision. The impression is, of course, in relief on one side, and in intaglio on the other. This thin plate is then placed on a sort of frame, with supports to keep it extended in a true and



INTERIOR OF THE VAULTS.

Finishing the plates.

The subterranean vaults.

New editions.

even position, and a backing of type-metal is cast upon what a lady would call the *wrong side* of it, and thus a solid, substantial plate is formed, thick and firm enough to be used safely in printing, and yet not one fifth part as heavy as the original page of type-matter from which it was formed.

The plates are all minutely examined when they are cast, and are properly trimmed and finished. They are made as nearly as possible of a uniform thickness. Of course, there must be one plate for every page of the book to be printed.

The accumulation of electrotype plates in a large establishment that has been long in operation is very great. In the Harper Establishment, the stores now on hand are enormous. Those of the Magazine alone are rapidly approaching ten thousand.

The plates are stored in subterranean vaults built under the streets that surround the building. The entrance to these vaults has already been shown in the sectional view of the Cliff Street building, on page 42. A more enlarged view is shown on the preceding page. The vaults extend under ground for two hundred feet in length, and in dimensions are eight feet wide by eight feet high. They are shelved on both sides, and the shelves are loaded with plates—stereotype or electrotype—representing all the works published in the establishment. There is one plate for every page of every one of the many hundreds of volumes which the house publishes, making from fifty to seventy tons in all.

When a new edition of any book is required, the plates are brought out from these vaults and put upon the presses. When the work is finished, they are taken back again to the vaults.

Two distinct kinds of engravings in common use.

CHAPTER XI.

ENGRAVINGS.

To those who have not had an opportunity to know much about the processes of printing, there is quite a mystery in respect to the manner in which the engravings are made.

There are two entirely distinct modes of making and printing engravings in common use. These two modes are usually distinguished as *copper-plate* or *steel* engravings, and *wood* engravings.*

The former kind—that is, the copper-plate engravings, were made by cutting the lines of the picture in the surface of the copper-plate, and then filling these lines with ink, and afterward taking up the ink upon the sheet of paper by a strong pressure.

The second kind—that is, the wood engravings, were made by drawing the figure on the end of a block of very hard and close-grained wood, previously made smooth for the purpose, and then cutting away the wood from between the lines of the drawing, so as to leave the lines themselves in relief, thus exactly reversing the process in copper-plate engraving, in which the lines themselves were cut away. The figure was then transferred to the paper by inking the faces of the lines, and printing from them in a common printing-press, precisely as from types.

* Besides these, there is a third class of illustrations much in use, called lithographs. They are, however, not properly engravings, being printed from simple *drawings* made upon stone, and, therefore, they are not included here.

Copper and steel engravings.

Advantages of this method.

The names copper-plate engraving and wood engraving are, however, no longer strictly appropriate; for, instead of plates of copper, plates of *steel* are now generally used for the former mode. The steel is softened in the first instance, so as to facilitate the cutting of the lines upon it, and then is afterward hardened again, so as to make it more enduring under the constant rubbing to which it is subjected in the process of printing. It is wholly on account of its being so much more enduring than copper that steel is now more generally used for the material of the plate on which this class of engravings are made.

The essential distinction between the two modes is that, by the former, the lines of the design are cut in *intaglio*, as it is called, while by the latter they stand in relief.

Copper or steel engraving has this advantage over wood, namely, that finer work may be executed in that way. This, we might easily see, must necessarily be the ease, since, in engraving a fine design, it must be much more easy to cut the lines themselves in the material of the surface to be engraved, than to cut away the material on each side of the line, so as to leave the line itself in relief. It is subject to this great disadvantage, however, namely, that it requires an entirely different mode of printing from the ordinary letter-press of books—one, moreover, that is very laborious and slow; for, in the first place, the whole surface of the plate is covered with ink by means of a roller. The plate is then carefully wiped, so as to remove all the ink from the surface, and leave only that which lies in the lines of the engraving. The ink, lying as it does beneath the surface of the plate in the engraved lines,

 Mode of printing from copper and steel engravings.

must be *brought up*, as it were, by the impression; and this requires a very great force. This force is applied by passing the plate, with the sheet on which the impression is to be taken, under a roller. By this means, the whole force of the pressure is

brought upon the different portions of the sheet in succession, at the line of contact with the roller, instead of being diffused over the whole surface, and thus, in a great degree, weakened. The adjoining engraving represents the general form of one of these printing-presses as used fifty years ago. Great improvements



COPPER-PLATE PRINTING.

have been made in the construction of these presses since those days, but the principle is the same at the present day.

In printing from wood engravings, on the other hand, or from electro-plates, which are fac similes of them in copper, the lines of the design are *in relief*, precisely like the faces of the types; and the ink may be taken off from them by the same general pressure, exerted simultaneously over the whole surface of the plate, as that which takes the impression from the types. This species of engraving can consequently be worked in the same page with letter-press, and by the same impression.

This difference is of immense importance in respect to the prac-

Slow and laborious nature of the process.

tical working of the two methods, where great numbers of impressions are required. The engravings for Harper's Magazine, for example, by being cut in relief, can be worked in the power-presses with the other matter of the number. By this means, they can be printed with great rapidity, although still, on account of the vast number of copies that are required, the operation occupies a considerable time. If, however, the engravings were all in one form, the whole hundred and forty thousand copies could be worked off in a little more than a month from one press.*

If, now, on the other hand, we suppose the engravings to be executed in steel or copper, the result would be astonishingly different. I find, by an examination of the last number of the Magazine that has been issued at the present time, that it contains not less than sixteen solid pages of engravings. If we suppose that two of these pages were engraved on one plate, it would require, at the usual rate of printing by this method—say two hundred and fifty impressions per day—not much less than *two years* to work off the necessary number of copies from *one plate*, and that would be only two pages out of the sixteen; so that it would take *twelve or fifteen years*, with one copper-plate press, to print all the engravings required for one number, instead of a month or thereabout, as by the present method. Of course, by multiplying the

* In point of fact, the engravings are scattered through many forms, and it takes several presses, therefore, to print the engravings of one number within the month; and as portions of several numbers are being printed at the same time, there is an average of ten or twelve presses constantly employed on the Magazine. Sometimes twenty are at work upon it at one time.

Wood superior in certain respects.

Kind of wood used.

presses used, the work would be hastened, but it would require many hundreds of presses to do the work of one number within the month.

Thus we see that steel and copper-plate engravings can only be used as illustrations of literary works in cases where the number of copies to be issued is comparatively small. Then, moreover, they can not be printed on the same page with the descriptions referring to them, except at great additional expense, but must be on separate leaves.

In some respects, moreover, wood engravings, when executed in the highest style of art, are superior to those on copper or steel. There is a certain indescribable boldness and richness of effect that characterizes this mode when it is carried to perfection which can not be produced on copper or steel.

In making a wood engraving, the first thing to be done is for the artist to draw the design on the block of wood to be engraved. The wood used must be of a very fine and compact grain. Boxwood is the kind generally employed. In fact, no other wood has yet been discovered with a grain close enough to serve for fine engravings. As the boxwood is a small tree, blocks of sufficient size for large engravings can be procured only by gluing together a number of pieces. It is prepared by being sawed off in blocks from the end of the log, and then squared and smoothed in a very exact manner. These operations are performed by means of very ingenious machinery, at large establishments devoted expressly to the business. The thickness of the blocks is uniform, being the same as the length of the types, in order that the blocks, when engraved,

The designer.	His mode of proceeding.	Döpler.
may be set up with the types in a page of matter. The size of the bloek, of course, varies with the size of the design.		

In making the design, the artist sometimes reads the work of the author, and selects his subject, and sometimes the author himself selects the subjects, and gives the designer a description of them. The artist then makes a design and drawing corresponding to the description. To illustrate this more fully, I give here an actual description of a design, selected at random from the last set which I sent to Mr. Döpler, the artist who makes many of the drawings for these Story Books, and insert also an engraving of the design which he made, that the reader may compare them. The design belongs to a set made to illustrate a future number of the Story Books entitled JOHN TRUE. Of course this block will be used twice. It is employed here to illustrate the nature of designing. In the story, when we reach it in the series, it will come in again, in its proper place, to illustrate the narrative.

The following is the description sent:

LUNCHEON.

A corner in a handsome breakfast-room in the Fifth Avenue. A small table neatly set for luncheon near a large bow window. Rich furniture partly or wholly shown. Handsome curtains to the window. Two pretty children, John True, and his sister, five years old, are at the table eating their luncheon, which consists of chicken-pie, and a tumbler of milk for each. Pitcher on the table. The children are dressed very plainly and simply.

On the facing page you will see the design which the artist made.

Specimen of a design to be compared with the description.



THE DESIGN.

By comparing the description with the design, the reader will see how much in all cases is necessarily left to the inventive genius of the artist in respect to all the details of the work. Some-

Common mistake.

Designing an intellectual art.

Preparation of the wood.

times persons imagine that being able to draw prettily upon paper or Bristol-board, from engravings or from drawings made by other persons, is evidence of qualifications to make original designs on wood for the engraver, but a very few trials will in most cases convince them how great is the mistake. The penciling is merely the mechanical part of the work. Designing, on the other hand, is purely an intellectual process, and it requires intellectual qualities of the highest order to perform it successfully. There must be a poetical fancy, great powers of invention, and a refined and delicate taste combined. The putting of the drawing on the wood is only a mechanical mode of expressing the conceptions of the mind. The success of the work will depend, of course, altogether on what the conceptions are that are expressed, and this depends on the structure of the mind, and not on the skill or training of the hand.

In other words, a designer is a *poet* whose hand has been trained to express his mental conceptions by drawing. Where the conceptions of the mind are meagre, weak, and prosaic, no skill of the hand will be of any avail, for the hand can not change the conceptions. It can only express them as they are.

In drawing on the wood, the artist first whitens the surface of the block by applying a composition to it. He usually sketches his design first in outline on paper, and then transfers the tracing to this white surface by pressure. He then goes on to finish the drawing. It would be difficult to draw on a thick block, if it were placed by itself upon a table or desk, for want of a support to the

The drawing-board.

Materials and implements.

Models.

hand, especially at those parts of the design which come near the edges. To remedy this inconvenience, the artist uses a sort of drawing-board or tablet to place his block in while he is drawing upon it. This tablet consists of a board with a flat border on two sides of it. The border is about two or three inches wide, and is of the exact thickness of the block. The block is placed upon this board in the angle of the border, and thus the upper side of the border forms a continuous surface with the upper side of the block, and serves as a support to the hand in drawing.

Besides this tablet, the designer requires but few instruments or implements for his work. He must have a variety of pencils, of various degrees of hardness and blackness, and a pair of compasses, and scales of equal parts, and tracing-paper, brushes, and India ink, and a few other similar materials, and this is all. He, however, requires many aids in the way of models and patterns. It is true that, in all original designs that he makes, he must depend upon his own inventive fancy for the general conception of the scene, and for the selection and disposition of the objects that he introduces ; but in drawing the details, he must have either these objects themselves before him, or else good drawings of them made by others, except in the case of those comparatively few forms which he has drawn so often that he already knows them thoroughly. This makes it necessary for him to have in his studio a great number and variety of models of forms, and also books and portfolios of engravings, and other objects and works of art, to aid him, and these generally make the studio a very attractive place.

View of Döpler's studio.



THE STUDIO.

Mode of engraving the blocks.

Lines of the shading.

The shadow.

When the artist has finished a set of designs, the blocks containing the drawings are sent to the engraver to be cut. This work of cutting consists, as has been already explained, in cutting out all the wood *between the lines* of the design, so as to leave the lines themselves in relief.

This any one not well acquainted with the subject might well suppose to be impossible, so fine are the lines, and so close together do they lie in a good drawing. Just look, for example, at the engraving of the Studio, and observe the drawing of the surface of the wall above and around the picture which hangs over the mantle-piece. The drawing consists of a series of fine lines, very near together. Now, in cutting this part of the block, the workman, with a fine and sharp-pointed tool, cuts a series of grooves, leaving the part of the wood which represents the lines in relief. You will easily imagine how nice and minute an operation this must be. And yet this is comparatively a very simple case, and very easy to be engraved. Look, for another example, at the shadows of the picture-frame on the wall, on the right-hand side of it—that is, on the side opposite the light. That shadow is made by leaving an extra line there between every two of the regular wall-shading. It will, perhaps, be necessary to examine the work with a magnifying-glass to see distinctly, though the general effect produced—that is, the appearance of a shadow, is visible at once to every eye.

It is so with every portion of the engraving. Examine it carefully in every part, and wherever you see a light part on the paper, there you may know that the wood has been cut away; and wherever you see a line or a black surface, there the wood has

The engraver's implements.

The magnifying-glass.

been left. The ink, of course, only takes effect where the wood has been left, and thus the lines and shadings of the design are printed.

Where the lines of the drawing cross each other, as they often do, there the difficulty of engraving it is greatly increased, as the wood must in those cases be cut away in the interstices of the crossings, which is an extremely nice and delicate operation.

The engraver, when engaged at his work, sits at a high table placed in a clear light. Attached to the stand on which he supports the block while he is cutting it, there is a magnifying-glass, placed in such a position as to be before his eye when he is engaged at his work. It is only quite a coarse style of engraving which can be executed with the naked eye.

The process of cutting the block is very laborious and slow. To engrave the one used for the frontispiece of this number must have required not less than ten or twelve days of incessant labor.

When the block is engraved it is sent to the compositor, and he sets it in its place in the page in which it is to be printed, having previously adjusted the thickness of it exactly to the length of the types, so that the upper surface of it may come on a level with the faces of the types, and thus the whole be printed together.

When the pages are thus made ready, the engravings being all inserted in their places, and the letter-press being made correct, they are wedged up in chases, one or more in each, according to the size of them, and are sent to the electrotyping department to be electrotyped, in the manner already explained.

CHAPTER XII.

THE PRESS.

IN the engraving on the next page we have a representation of a hand-press, of one of the most approved modern forms. The great power-presses that are driven by steam, though much larger and much more complicated in their details, are substantially the same in all their essential parts, and the principle of the machine can be more easily understood in the simpler model.

The essential parts of all printing-presses are these :

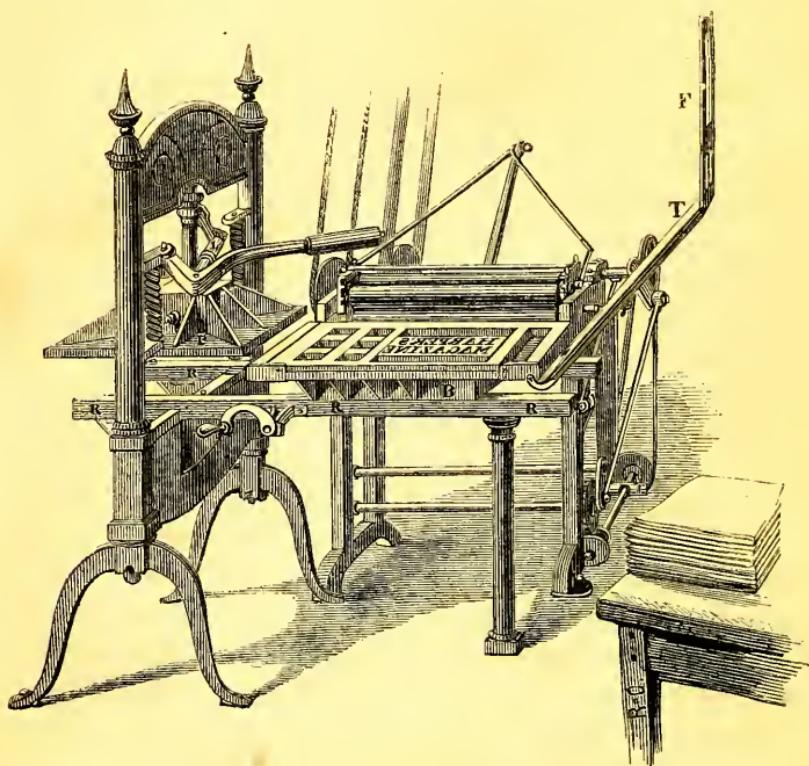
1. The Bed.	4. The Carriage.
2. The Tympan.	5. The Platen.
3. The Frisket.	6. The Power.

These will be explained in their order.

You will perceive, however, in the first instance, that the general framework of the press consists of two upright pillars supported on a stand, with a sort of table extending horizontally from the pillars toward the right. The pillars are connected together by two very solid and heavy cross-pieces, one above and one below. The upper one of these cross-pieces is called the head of the press. The lower one forms a support for the bed when the pressure is applied. The pressure being thus exerted between these two cross-pieces, of course the whole strain comes upon them, and upon the upright pillars to which they are secured. It is necessary, therefore, to have this part of the framework very strong.

Engraving of the hand-press.

Great strain upon the upright pillars.



THE HAND-PRESS.

In former times, these upright pillars were made of very thick and solid beams of wood, with heavy blocks of wood, for cross-pieces, bolted and screwed firmly to them above and below. Afterward they were made of cast iron, the upright parts and the cross-pieces being all cast in one solid mass. At the present time

The action of the press described.

Functions of the various parts.

wrought iron pillars are used, and thus the same strength is attained with a much greater degree of lightness.

The action of the press is simply as follows: B is the bed. The form to be printed is placed upon it. In the engraving, the press is represented as prepared for printing one of the large placards for Harper's Magazine. We see the words in the form as it lies in its place upon the bed. The words are, of course, reversed, but they will come right when printed, or when seen in a looking-glass. T is the tympan. The sheet to be printed is placed upon it. F is the frisket. The use of the frisket is to hold the sheet close upon the tympan when the tympan is turned over upon the form. The frisket is a light iron frame, covered with paper, and moving on hinges, with openings in the paper to correspond with the pages of the form that is to be printed. When the sheet is placed upon the tympan, the frisket is brought down over it, to hold the paper, and then the tympan is brought down to the form. Of course, the paper comes over the face of the types, which have been previously inked by the rollers seen behind, and the tympan comes upon the back of it. The tympan consists of a piece of India-rubber cloth stretched upon a frame, with one thickness of flannel or something similar placed behind it, and kept in its place by a lining of muslin. Its object is to equalize, as it were, the pressure upon the sheet of paper on the form.

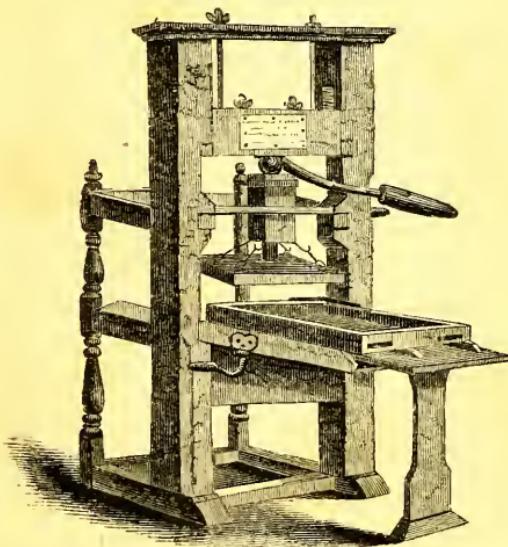
And now the bed of the press, B, carrying the form, with the tympan and frisket folded over it, is run backward along the rails, R, R, on a sort of concealed carriage, worked by a crank, seen in the side of the rail, until it is under the platen, P. This platen

Comparison of the modern press with those of old times.

is simply a thick iron plate, strongly braced, and arranged so as to be movable through a short space up and down. L is a lever connected with a joint which furnishes the power for pressing the platen down. It is worked by means of the long handle extending to the right. The pressman runs the form in under the platen with his left hand by means of the crank, and then, with his right hand, pulls the handle, and forces the platen down with very great power upon the tympan, thus pressing the sheet hard upon the face of the types, and causing it to take the impression. Then pushing back the handle, the two spiral springs seen above on each side lift the platen up, and the form is released. The pressman

then runs the form out, as he had run it in, by turning the little side crank, and, unfolding the frisket and tympan, he takes out the sheet and puts in another. While he is doing this, the roller, seen behind, by means of some curious machinery connected with it, comes forward, and inks the form so as to be ready for a new impression.

The adjoining engraving is a correct represent-

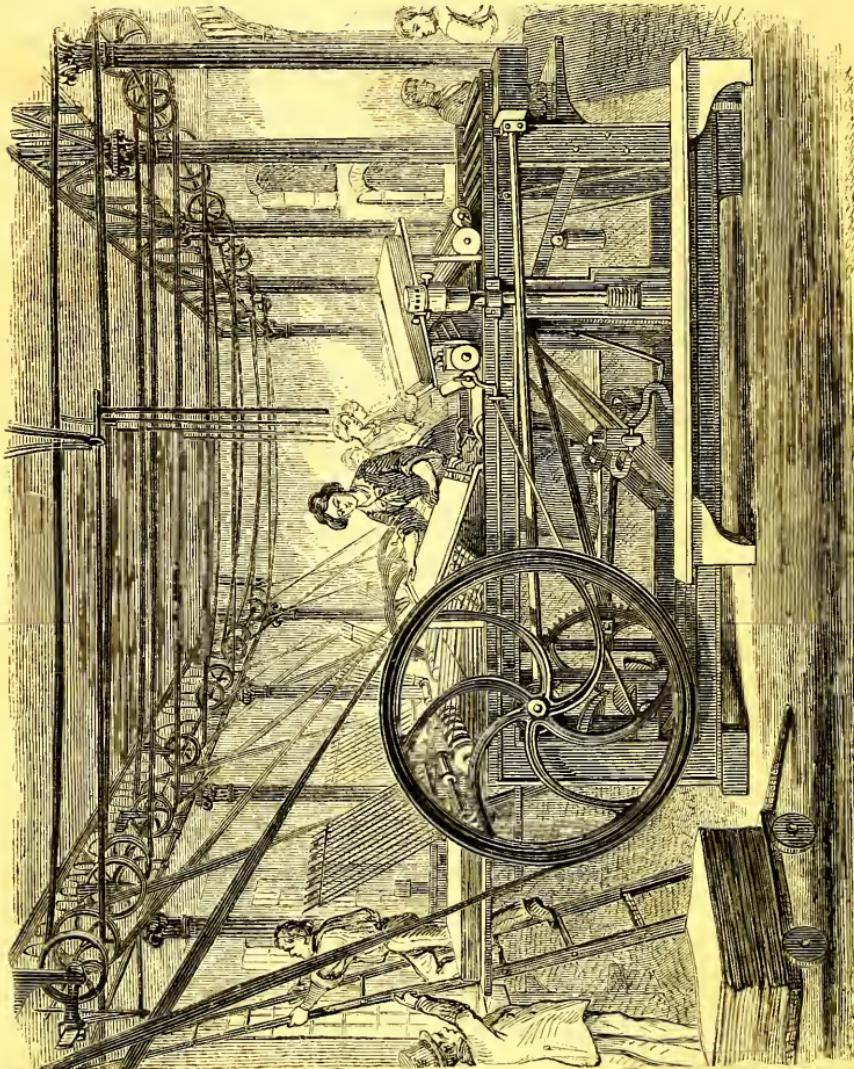


FRANKLIN'S PRESS.

Great progress made in the mechanical arts during the last half century.

ation of one of the presses used by Franklin before the Revolution. It is of comparatively very rude construction, but the reader will observe that the same essential parts are to be seen in it that have been described. The frisket is folded down, and so does not appear; but the tympan is there, and the bed, and the earriage, and the platen, and the power, which in this ease is a screw.

The great difference in the mechanism of the two machines illustrates in some measure the immense progress that has been made in the course of the last half eentury in the meehanical arts; and yet, to get a full and complete idea of this progress, we must compare Franklin's press, not with the hand-press already deseribed, but with one of the great power-presses, by means of which almost all the prodigious printing operations of the present day are performed. A reprcsentation of one of these presses, as it stands in the great press-room of the Harper Establishment, is seen in the following page. It is too complicated to be fully described in detail, but some of the more prominent features of it may be pointed out. The girl who stands at it is ealled the feeder. She has a pile of damped paper on a stand over the press. The pile is inelined a little toward her, so as to make it easier for her to draw off the successive sheets. Under this pile of paper is the platen. We recognize it by the iron braces partially seen beneath the stand on whieh the paper is placed. The form is beneath the platen, and is not in view. It rests there on the bed of the press, whieh is likewise hidden. To the right, we see a part of the system of rollers by whieh the form is inked. The feeder has just placed a sheet to be printed on the inelined table before her. This



THE POWER-PRESS.

Description of one of the power-presses.

table is called the *apron*. In a moment a set of iron fingers will come up from below, and, taking hold of the lower edge of the paper, will draw it in under the platen, between the platen and the form. The revolution of the machinery will then bring an immense power into operation, by means of cams and levers seen below, by which the bed of the press, with the form and sheet upon it, are pressed up for a moment with great force against the platen. This makes the impression. The form then descends again, and the sheet, by a very ingenious and peculiar mechanism, passes out *under* the apron on which the feeder originally placed it, toward the left, where the edge of it jumps up very mysteriously upon a series of endless tapes, which may be seen in the engraving through the fly-wheel.* From these it is taken up by a light frame, formed of long and slender rods of wood, and is carried over and laid down upon the pile at the extreme left of the engraving. Thus the work goes regularly on, with no attendance whatever except the placing of each successive sheet within the reach of the iron fingers which are to draw it into the machine.

Visitors who watch the motions of the press while it is performing its work are always particularly pleased with the life-like actions of the iron fingers that come up and take hold of the lower edge of the sheet of paper on the apron, and, after lifting it gently over the *ledge* formed on the lower side of the apron to prevent its

* The term *endless*, when used in such a connection as this, in the description of machinery, denotes that the band, or chain, or whatever else it may be to which it is applied, passes over two pulleys at a distance from each other, and is joined at the ends, so as to revolve continuously between and over the pulleys.

Ingenious mechanical contrivances.

Appearance of the press-room.

sliding down, draw it in under the platen to be printed; and when the sheet comes out again, under the apron, after receiving the impression, they wonder by what means the edge of it is made to leap up so dexterously upon the tape-lines that are to carry it away. They often watch this motion very closely a long while without being able to discover how the effect is produced. The explanation is, that the edge of the sheet is *blown* up by a puff of wind from below. There is a pair of bellows concealed in the frame-work of the press, and at precisely the right instant the revolution of the machinery gives a puff from it up through a row of holes exactly under the edge of the sheet of paper. The impulse of this puff throws the edge of the sheet up to the tapes, and the long fingers of the frame which is to lift it over and place it upon the pile having previously laid themselves between the tapes, the sheet is received upon them, and immediately afterward is carried over. In the engraving, this frame, which is called a fly, has just carried over one printed sheet, and is coming back for another.

There are nearly thirty of these presses in the great press-room, and there is something imposing and almost sublime in the calm and steady dignity with which the ponderous engines continue their ceaseless toil. There is, indeed, a real dignity and a real grace in the movements which they perform. The observer looks down the room from the elevated desk of the foreman, and surveys the scene with great interest and pleasure, wondering at the complicated massiveness of the constructions, and at the multitude of wheels, and pulleys, and bands that mingle and combine their motions with the revolutions of the machinery. His attention is

Storage of the electrotype plates.

Drying and pressing.

particularly attracted to the action of the *flies*, as they rise in succession, one after another, in all parts of the room, bringing up the beautifully printed sheets from the press, and, carrying them over, lay them gently down upon the gradually accumulating pile.

When all the forms of the book which is in hand have been "worked off," as the phrase is, the electrotype plates of the several pages, having been previously separated from the blocks, are taken back to the subterranean vaults, and are there safely stored away in the compartments assigned to them. The place of the entrance to these vaults was shown, and some account of their extent was given, in a previous chapter. The number of plates accumulated there, enormous as it is, is increasing at the rate of, upon an average, two hundred a day.

CHAPTER XIII.

DRYING AND PRESSING THE SHEETS.

SHEETS of paper to be printed require, as has already been remarked, to be made damp before being put upon the press. When perfectly dry, they do not take the ink well. Of course, after they are printed, the first process is to dry them.

Newspapers are not dried, but are distributed to the subscribers just as they come from the press. There is not time to dry them, for they must ordinarily be issued immediately. But sheets which are to be folded and formed into books require to be dried and then to be pressed. This pressing is necessary, not only for the purpose of flattening out the warpings and twistings in the sheets,

The drying-room.

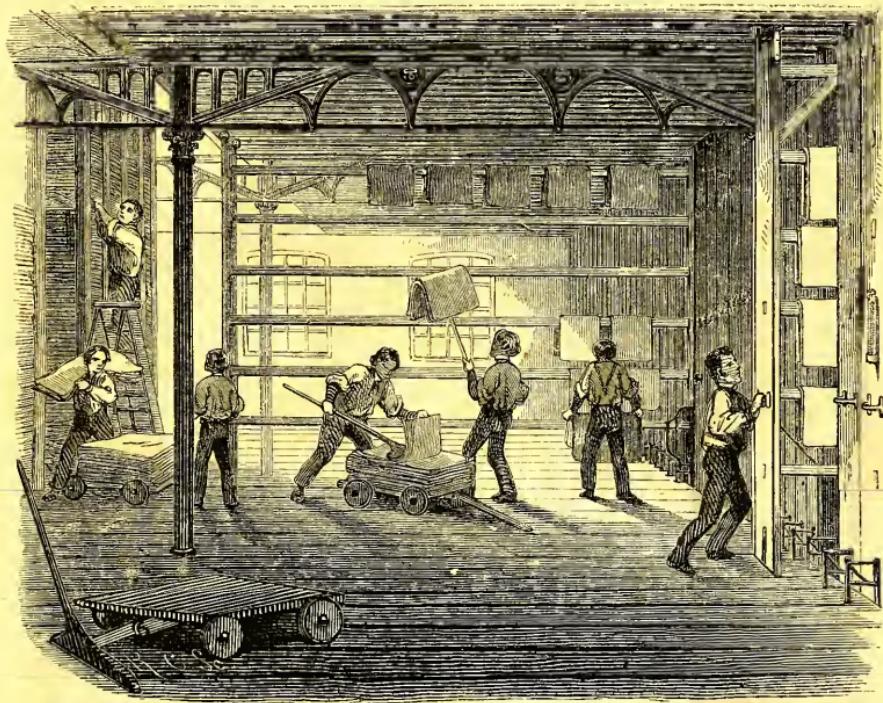
Mode of placing the sheets on the drying-frames.

produced by their having been wet and dried, but also to remove the little burr or protrusion in the paper made by the pressure of the types.

The process of drying the sheets has already been referred to, and the place where it is performed is shown in the section on page 42. It is in the second story, and in the first division of that story toward the left. The opposite engraving gives an enlarged view of the drying apparatus. The men on the left are bringing the sheets to be dried. They take them down from a stack of sheets piled up in the racks so high that it requires a ladder to reach them. The sheets are moved from place to place about the floor by means of trucks. One of these trucks stands by itself in the foreground. In the centre of the picture, three men are employed in placing the sheets upon one of the frames, which has been drawn out for the purpose from the drying-room. The workmen put the sheets on the lowermost bars of the frame with their hands. The higher bars are reached by means of a pole, with a cross-bar at the top of it. The form of this instrument, and the manner in which the workmen load it with the sheets—several at a time—is seen by the action of the man who is standing at the truck, near the frame. When the sheets are put upon the pole in this way, they are lifted up and placed across the upper bars of the frame, as we see in the action of the central figure of the group.

When all the bars of the frames are filled with sheets, the frame itself is pushed into the drying compartment. The end of each frame consists of a board of the same width as the distance at which the frames stand apart when they are in their places, and

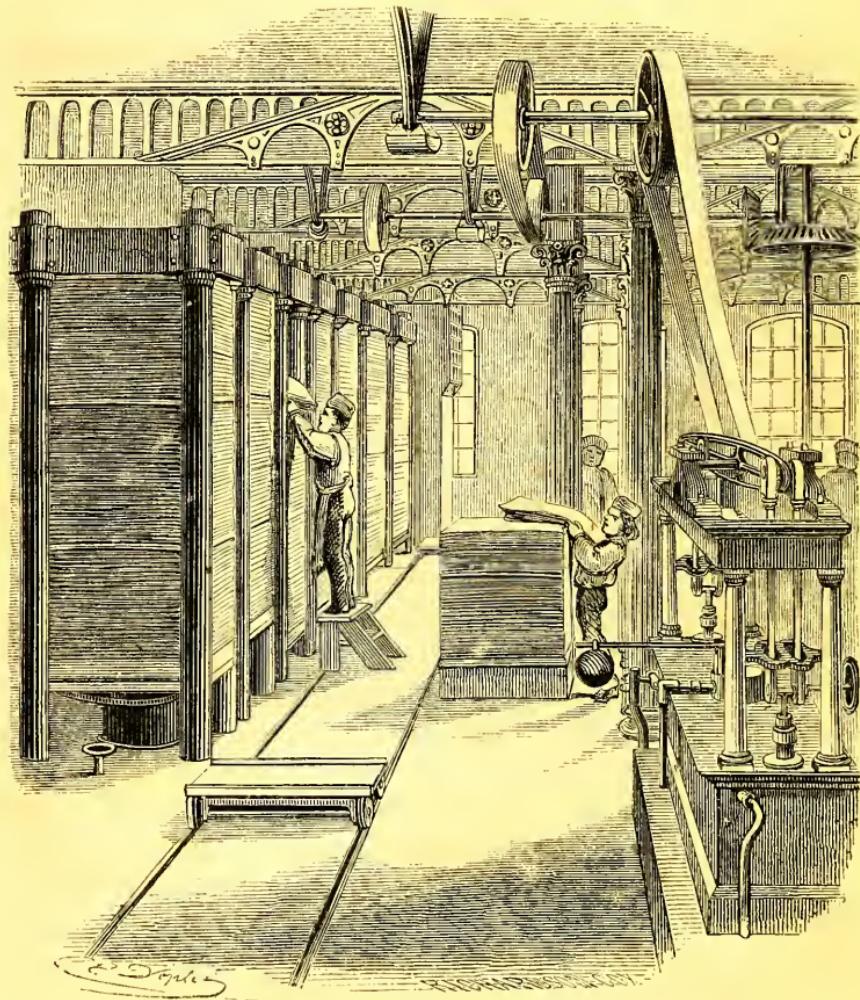
Construction and arrangement of the drying-room



THE DRYING-ROOM.

thus these boards, when the frames are all in, form one continuous partition, which shuts off the compartment closely from the rest of the room, and keeps the hot air within it confined till the sheets are dried. Of course, there is a proper arrangement for ventilation, in order that the vapors produced by the process of drying may be carried away.

View of the hydraulic presses.



HYDRAULIC PRESSES

Account of the hydraulic pump and of the hydraulic presses.

There are over forty of these frames in the compartment. They will contain twelve hundred sheets each, making about fifty thousand sheets in all that may be dried at one time. The process of drying requires about a day.

The frames can be moved in and out very easily, for they are all suspended by pulleys or trucks, that run upon little railways placed near the ceiling above.

When the sheets are dried they are to be pressed. The pressure is applied by means of a hydraulic pump. A view of this engine is seen on the right, in the foreground. Though it does not appear large in the engraving, the force of pressure which it exerts is not less than five hundred tons. It consists simply of a double-acting force-pump, with cylinders of small bore, but with a great force from the engine to act upon the pistons. This forces the water through a very strong pipe beneath the floor to other cylinders, fitted also with pistons, under the presses. These other cylinders are large. Of course, whatever force is applied to the small pistons in the pumps, an equal amount of pressure is produced on every square inch of the large pistons in the cylinders under the presses, and thus a prodigious pressure on the sheets of paper is the result.

We see the upper part of one of these large cylinders under the first of the presses on the left. Above it is a square iron plate, which forms a base on which the pile of sheets of paper to be pressed rests. This plate, like those of similar function in the printing-press, is called the platen. It is very thick, and is stiffened beneath by iron braces, which are partially seen in the en-

Mechanical contrivances.

Shifting the sheets.

graving. The little circular handle which is seen rising up out of the floor, opposite the end of the press, is connected with a valve, by which the water in the great cylinders may be let off, and the pressure relieved.

The presses themselves stand in a row at the end of the room. They occupy the right hand of the second story of the building, as shown in a sectional view of the different stories on page 42. Each press may be connected with the pump, or disconnected from it at pleasure, so that one may be giving up or receiving a supply of sheets while the others are full and in action.

The manner of placing the sheets in the press is shown in the engraving, where a man is seen at the third press in the row, standing on a step-ladder, and making up the pile. The arrangement for taking this pile out when it has been sufficiently pressed is exceedingly ingenious and convenient. In front of the row of presses is a little railway, as seen in the engraving. This railway is traversed by two small cars, one of which is seen distinctly in the foreground. The other is in the distance, and is partly concealed. These cars serve the purpose of bridges to convey the piles of pressed paper *across* the railway, or as cars to move *along* it, as may be required. For this purpose, two short rails are laid across each of them. We see these cross-rails very distinctly in the bridge which stands in the foreground. By means of these cross-rails, the whole pile of paper may be run out upon the bridge; for the pile itself, while in the press, rests upon trucks and rails above the platen, which are, however, concealed from view. The machinery is so arranged that when the bridge is placed opposite one

The railways.

The flying bridges.

Pasteboard sheets.

of the presses, the rails on the bridge correspond exactly with the rails on the platen in the press, which the pile of paper rests upon, and also with the rails of a square stand placed opposite, just outside the long rails. We see one of these stands, with a low pile of paper upon it, where the boy is at work taking the paper away.

In a word, by trundling the bridge along the railway in the floor, it may be placed in such a manner as to form a railway above, running *across* from the presses to the stand outside, by means of which the whole pile of pressed sheets may be rolled out at once to a situation where the boys can come conveniently to take them away, while, in the mean time, the press itself is at liberty to be filled up at once again.

These facilities for moving the masses of paper are the more necessary, on account of the great quantity that the presses receive at a time. The stack is nearly six feet high, and weighs about a ton.

Each sheet, when it is put into the press, is placed between two sheets of thin, but very smooth and hard pasteboard. It is very plain that the sheets would not be pressed smooth by coming in juxtaposition with each other. The processes of putting the sheets in between these pasteboards, and taking them out again after they are pressed, is quite an interesting one, on account of the very systematic and rapid manner in which it is performed. Opposite the presses, and just beyond the right-hand margin of the last engraving, there stands a range of very wide tables where this work is done. It requires two men at each table to do it. One takes out from between two sheets of pasteboard the sheet of paper that

Changing the sheets.

Gathering.

The signatures.

has been pressed, and the other, at the same instant almost, puts another in, shifting the several sheets, both of paper and pasteboard, from pile to pile, in the course of the manipulation, with a dexterity and rapidity that is surprising. As fast as a sufficient number of the rearranged sheets are ready, a boy takes them away, and places them in the press, while another boy continually brings a fresh supply of those that have been pressed to take their places.

The pressing which the sheets receive in this operation makes an astonishing difference in the smoothness and beauty of the page when the book comes to be bound.

CHAPTER XIV.

FORWARDING.

WHEN the sheets are folded, they are *gathered*, as it is termed ; that is, a pile of each sort being laid out along a table, a girl takes from each pile one, and puts them together in the proper order, so as to form the book or pamphlet.

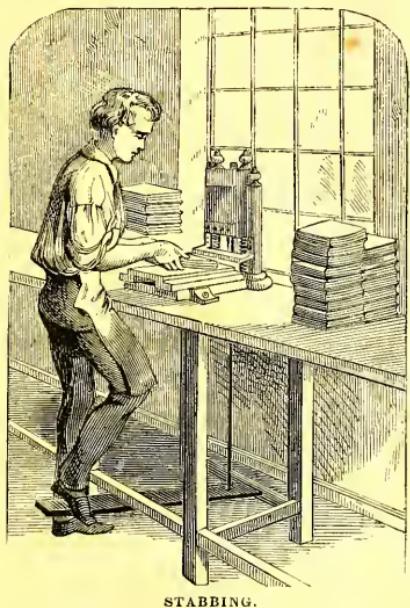
These separate sheets are all marked at the foot of the outer page of each of them with what is called the *signature*, that is, with a letter or figure which denotes what sheet it is of the series. The girl glances her eye at these signatures when gathering the sheets, and thus makes sure that there is no mistake, but that she is taking them in their proper order. You will see these signatures in this book by looking at the foot of the pages following every sixteenth page—that is, at the foot of pages 17, 33, 49, &c. You will observe that the letters succeed each other in regular order.

The process of stabbing.

Sewing.

Sawing the backs.

If the work is a pamphlet, as, for example, a number of the Magazine or of the Story Books, it is *stitched*. If it is a bound book, it is to be *sewed*.



STABBING.

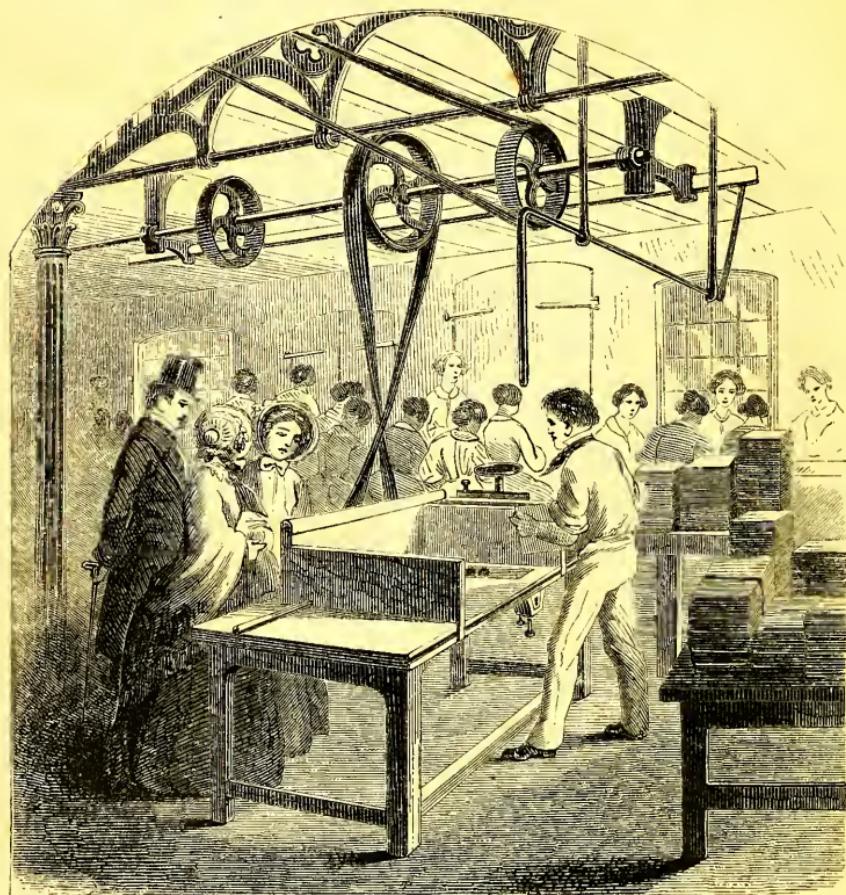
To prepare the pamphlet for stitching, three holes are made through the sheets by means of a machine called a *stabbing machine*. The pamphlet to be stabbed is laid by the workman upon a flat board, and then, by means of a pedal, or lever, worked by the foot, three steel points are brought down through the paper, so as to make the three holes required for the twine by which the pamphlet is to be stitched.

You will see these holes, and the

twine passing through them, by examining any pamphlet.

Books that are to be bound are *sewed*, as it is called; this is quite a different process from stitching. To prepare the books for being sewed, the first step is to *saw* small grooves through the backs of them, deep enough to receive the bands of twine to which each sheet is secured. The sawing of these grooves is performed in what is called a sawing machine. This machine consists of a table, with two iron rails upon it running from end to end. On these rails is a sort of box, or rather frame, with sides and back,

View of the machine for sawing the backs.



THE SAWING MACHINE.

but no front. This frame traverses the table to and fro on the

Account of the sawing machine.

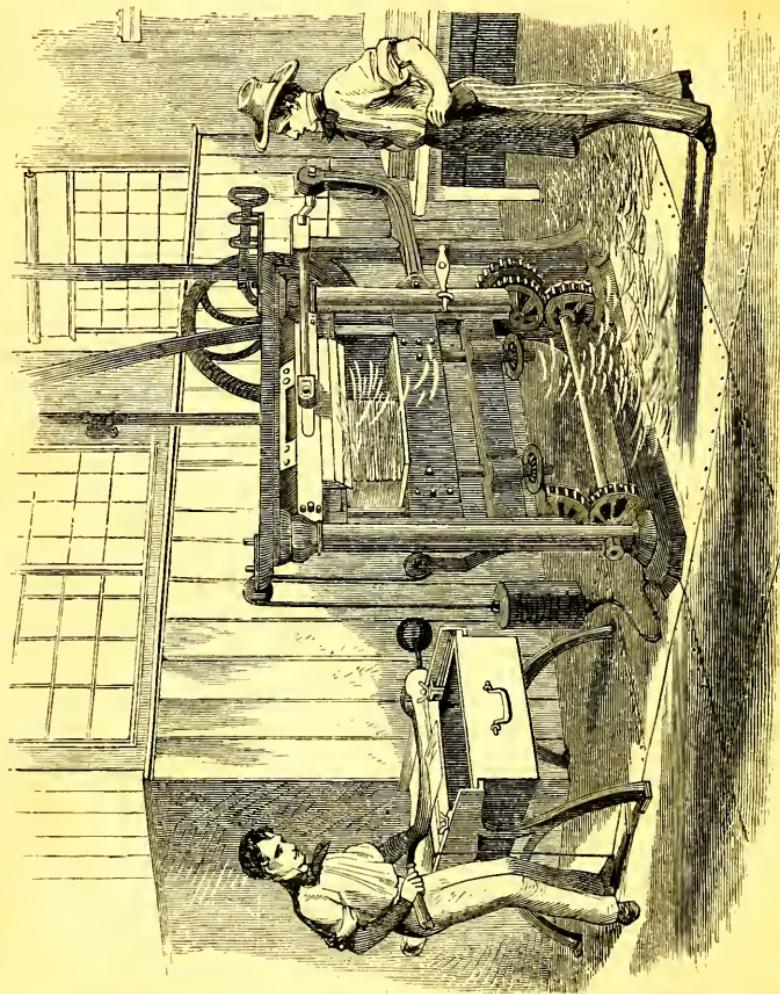
Tables for sewing books.

rails. The workman takes a quantity of folded sheets from a supply made ready for him on the tables near, and, placing them in this frame, he wedges them in securely. Beneath the table are placed several circular saws, arranged at the proper distance from each other. The teeth of these saws project a little above the table, through an opening made in it, in such a manner that, when the frame is run along over them, the grooves are sawed in the backs of the sheets.

The sheets are then to be sewed. This operation is performed by great numbers of girls, seated at long tables, extending in rows along the room, as shown in the sectional view in page 42. The sewing of the books is a great work. The ranges of tables devoted to it are so extensive as to furnish accommodations for one hundred girls, and each place is provided with a seat and a stool, that may both be raised or depressed, to suit the comfort and convenience of the occupant.* Every visitor who sees these girls at their work is struck with the extreme rapidity and dexterity of their movements, and with the healthy, and happy, and highly attractive appearance which they themselves and the scene of their labors exhibit. Indeed, so far as my observation goes, one of the chief subjects of remark with strangers, after coming away from a visit to the whole establishment, is the intelligent and manly bearing of the men who are employed in it, and the attractive appearance and lady-like manners of the girls.

* The number of girls employed in the gilding-room is 12; in the sewing-room, 100; in the gathering and folding-room, 150; and in the press-room, 30, making nearly 300 in all.

View of the cutting machine and of the great shears.



THE CUTTING MACHINE.

Machine for trimming the edges of books.

Marbling.

On the opposite page is an engraving of one of the different kinds of machines by which the edges of the books, when sewed, are trimmed. A pile of the books is screwed up very tight in a massive frame, as seen in the engraving, and then a long and straight blade of steel is made to traverse to and fro with great rapidity, the frame gradually rising, as the blade cuts its way through the pile of books, until the edges of the whole pile are trimmed smooth. The books are then turned, and the same operation is repeated on the ends.

The great shears seen in operation at one side are used for cutting up sheets of pasteboard to form covers for the books.

These preliminary processes, which all belong to the department of binding called *forwarding*, are performed chiefly in the fifth story of the Cliff Street building, as is shown more plainly in the sectional view.

CHAPTER XV.

MARBLING.

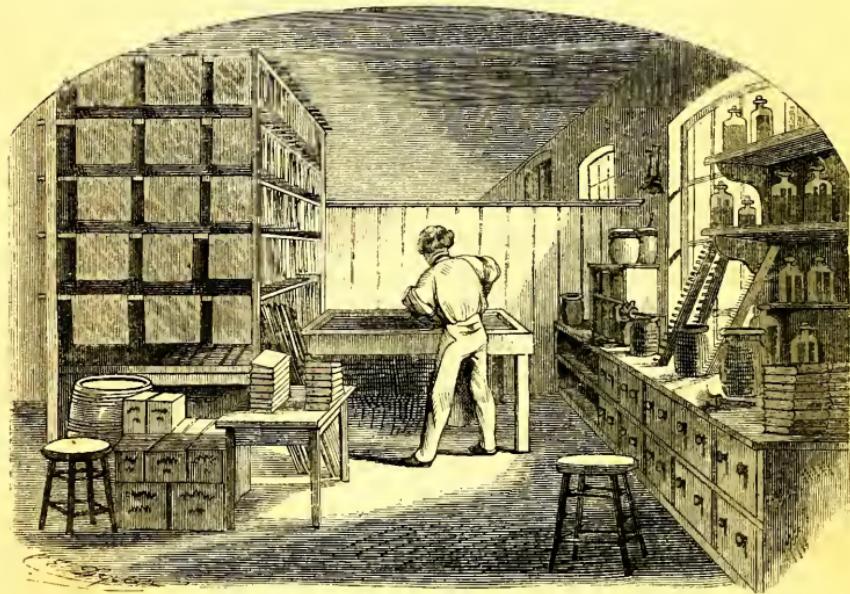
IN a corner of the forwarding apartment there is a small inclosure, partially separated from the rest of the room by low partitions, that is appropriated to the process of *marbling*. This is one of the most curious processes to be seen in the whole establishment. There are two forms of it—one the marbling of sheets of paper, and the other that of the edges of books. The process is essentially the same in both cases. It consists of sprinkling the colors first upon the surface of a liquid, in a sort of tank, and

General account of the marbling process.

The room.

then taking them off upon the surface to be marbled by bringing the paper, or the edges of the book, down gently upon the colors, and thus, as it were, *sponging* them up from off the surface of the liquid on which they were floating.

One would suppose that such an operation as this would be perfectly impossible, and visitors who witness it for the first time regard it with astonishment and delight.



THE MARBLING-ROOM.

The engraving represents a workman in the act of taking up a sheet of paper which he had just before laid down upon the surface of the liquid in the tank. On the right is a bench containing

The pots of colors.

Mode of sprinkling them upon the sizing.

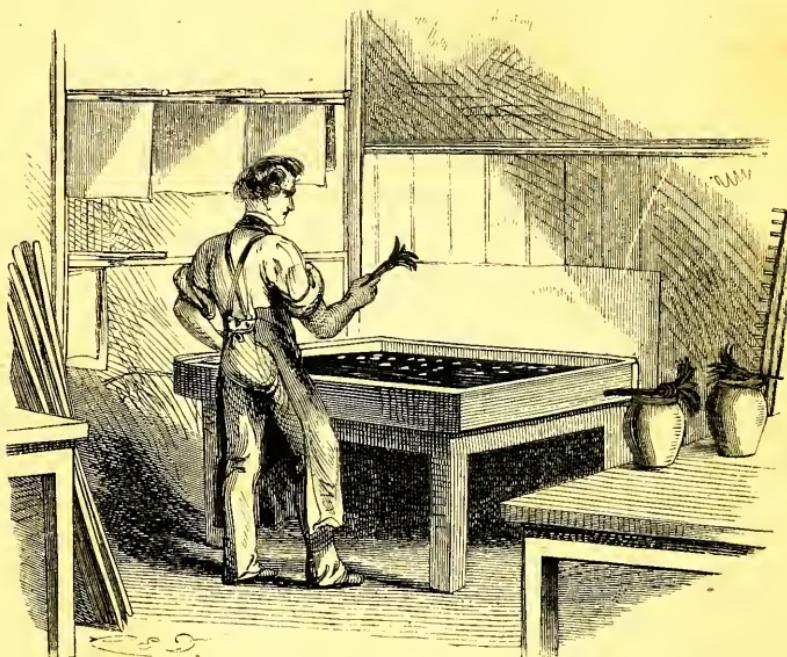
the pots of colors. They are mixed with water, and are of the proper consisteney to sprinkle easily from a brush. They contain, however, some eomposition which prevents their blending with each other when sprinkled, one after another, upon the surface of the liquid in the tank. Eaeh drop, when falling upon the spot made by the preeeding drop, instead of mixing with it, remains perfectly distinct, only crowding the color of the preeeding drop away a little to make room for itself, as we shall presently see.

The pots contain but a small quantity of coloring matter, little more than enough to cover the bottom of them. If it were otherwise, too much would be taken up by the brushes. The brushes themselves are of somewhat peculiar form, the bristles extending laterally more than is usual. When the surface of the liquid in the tank is ready to receive the sprinkling, the workman takes one of the brushes, and rolls it between his hands, by the handle, before he takes it out of the pot, in order to throw off the superfluous coloring from it; and then, holding it over the tank, he proceeds to sprinkle the surface of the liquid with it, throwing off minute drops from the brush by a peculiar and very dexterous motion. The drops fall upon the surface of the liquid in the tank like drops of rain upon a pond, only, instead of sinking and disappearing, they remain on the surface, spreading into pretty large and exeeedingly well defined and beautiful circular spots of red, bluc, green, or violet, as the case may be. The drops spread, some of them to the size of a quarter of a dollar, and are almost mathematically perfect in their form.

The workman then takes another brush from another pot, and

The colors do not mingle.

Mode of sprinkling them.



SPRINKLING THE COLORS.

sprinkles the surface again with another color. If the first color was red, the second may perhaps be blue. In this case, the blue drops, instead of mingling with the red, remain perfectly distinct from them, crowding them, moreover, more or less out of their places, and modifying the forms of them. For example, if a blue drop were to fall directly upon the centre of a red spot that was produced by the previous sprinkling, it would crowd out the red color to a wider circumference, while it would itself occupy the

Curious effects produced by the sprinkling.

centre, and we should have, in that case, a central blue spot surrounded by a concentric ring of red. On the other hand, if the blue drop were to fall upon the margin of the red drop, then it would push one half of the red spot back upon itself, straightening the side that it came in contact with, and expanding the opposite side. The result would be, in this case, a large circular spot, one half of which would be blue and the other half red, the boundary between the two being a straight line passing from one side of the spot, through the centre, to the other side. Of course, it is not often that either of these two cases precisely occurs. The drops of blue fall indiscriminately all over the surface of the liquid in the tank, and come upon the drops of red in every variety of position, producing, consequently, an infinite variety of forms by the combinations of the two colors.

In the mean time, the workman continues the process of sprinkling. He takes next some other color: it may be yellow, or green, or dark purple. Whatever it may be, the third set of drops fall as the others did, each making for itself a place by crowding the others out of the way, and producing new and still more complicated varieties of form. This sprinkling is followed by another and another, until at length there may be five, six, or eight different colors combined, and then, on closely examining the surface, you will perceive that the original red is still entirely distinct from the colors that have been subsequently added, not having *minglea* with them at all, even at the lines of contact with them, though the form of the spaces which it occupies is entirely changed. The original circles have entirely disappeared, and the red is now seen

Various modifications of the coloring.

Different patterns.

occupying only the curved and irregular interstices which lie between the drops formed by subsequent sprinklings. In a word, the whole surface of the liquid in the tank has become covered with brilliant and variegated colors, each different, one being separated from the next by distinct and well-defined lines, that wave and curve among each other in beautiful and endlessly-varied configurations.

The reader will understand all this much better by examining some piece of marble paper, if he can find a specimen at hand. By counting the number of colors, you can ascertain how many sprinklings were required for that particular sheet, and by observing the forms of the different masses of color in the light of the explanation given above, you can almost determine the precise order in which the different sprinklings were applied.

Sometimes the arrangement of the colors on the liquid in the tank is modified in a very curious way by drawing a sort of rake or comb along the surface of it. The instruments used for this purpose are of different kinds, varying in the fineness of the teeth, and in their distance from each other. These teeth, being drawn over the surface of the liquid in the tank, have the effect of *drawing* the colors, as they term it, and thus modifying the configurations in a very curious manner, producing a sort of honey-combed or scalloped appearance very difficult to describe, but which those who have seen it will easily remember. This is called the comb pattern.

When at length the sprinkled surface is ready, the workman takes a sheet of white paper, supposing that it is marbled *paper*

How the colors are taken up by the paper.

Number of patterns.

that he now wishes to produce, and lays it carefully down upon the liquid, beginning at one corner, and letting the sheet gradually down until it lies wholly on the liquid. He then immediately proceeds to apply a second sheet, the tank being of a size to receive two sheets at a time. He then takes the two sheets up again, one after the other; when it is found that the beautifully variegated colors which have been floating on the liquid have been wholly transferred to the sheets. They have been taken up by the paper, and so completely absorbed, too, into the substance of it, that the surface, all wet and dripping as it is, may be rubbed with the finger without in any degree disturbing the colors. The sheets, as they are taken up, are laid across a wooden rod, and hung upon a frame near by to drain and dry. We see the frame in the engraving, with the sheets hanging on it, to the left of the workman.

Of course, the number of patterns which can be formed by the different combinations of colors, and the different modes of applying them, are infinitely varied. If, for example, all the colors that are to be used in the pattern are applied to the liquid before the comb is drawn over the surface of it, then one effect will be produced; but if one of the colors is reserved until after the combing, and then sprinkled on, the effect, as may easily be seen, would be totally different, and this difference may be varied by reserving any one of the dozen different colors that are to be applied. And so with every other step in the complicated process.

There is one peculiar pattern, called the *wave* pattern. It is characterized by a series of waves in the coloring. The waves

The wave pattern.

How it is produced.

The burnishing.

succeed each other at short and regular intervals, passing diagonally across the sheet. This effect is produced simply by the mode of laying the sheet upon the colors. The workman begins at one corner; but then, instead of letting the successive portions of the paper down by a slow and uniform motion, he gives it, very dexterously, a series of gentle impulses, letting down the paper a short space at each impulse. This occasions a sort of fluctuation on the surface of the liquid, and the colors, whatever they may be, are taken up in waves.

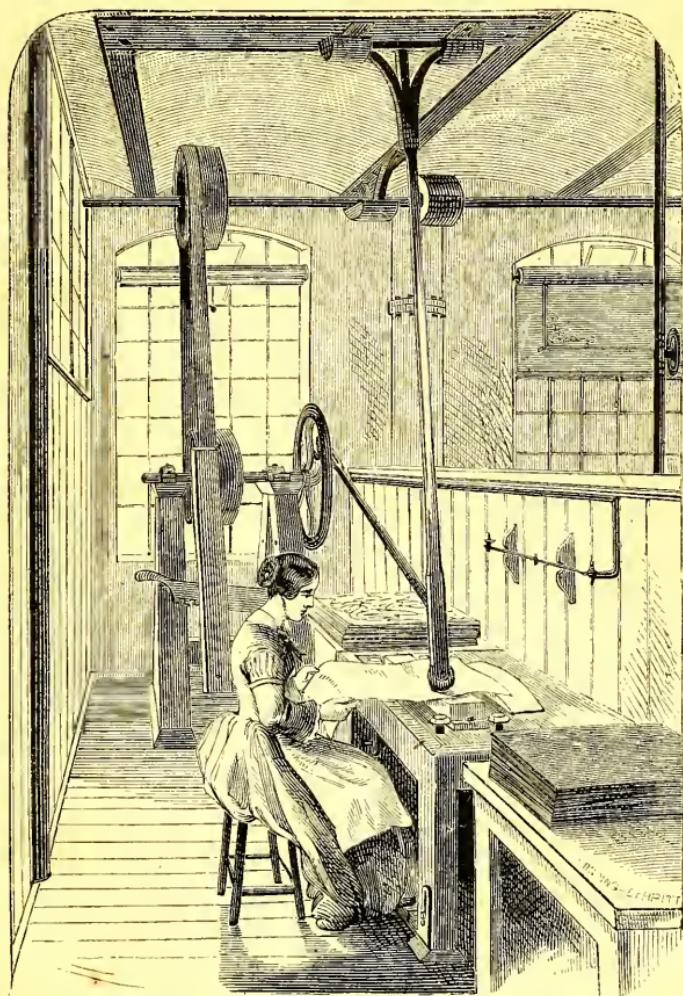
Then, besides the fine combs, there are large and coarse ones, with teeth several inches apart, by means of which the colors may be *drawn* in various ways over the surface of the liquid, so as to produce the appearance of streams, and an endless variety of other beautiful configurations.

It will easily be seen that the number of patterns which may be formed by the different combinations of these and other similar elements is literally infinite, and, of course, to be a good marbler, a man must possess excellent judgment and taste, as well as great skill.

The beautiful gloss which we see upon finished marble paper does not appear upon it when it first comes from the marbler's hands. This gloss is the result of a subsequent process of *burnishing*, which is represented by the engraving on the opposite page.

The burnishing is produced by means of a piece of polished flint or agate, which passes rapidly to and fro over the surface of

View of the burnishing machine in action.



BURNISHING.

Operation of the burnishing machine.

The bed.

Skill required.

the paper, the sheet being held for the purpose upon a sort of bed prepared for it to lie upon, on a very solid bench or table. The burnisher, as is shown in the engraving, is attached to the lower end of a long lever that descends from the ceiling. At the upper end of the lever is a joint, by means of which the lower end may be moved to and fro. Near the lower end is a bar, which may be seen passing off toward the window, where it is attached to a crank on the outer side of the wheel. When the axle of that wheel is put in motion by means of the band coming down from above and passing over the pulleys—seen at the left-hand end of the axle—the crank is turned, and the bar pulls the burnisher to and fro very rapidly over the surface of the paper.

The bed on which the paper rests while undergoing the operation is a block of wood set in a frame that is screwed to the bench. The end of it is seen in the engraving under the sheet of paper. The upper surface of this block is made concave, so that the burnisher, in moving to and fro, shall always be in contact with it. This bed is not absolutely fixed, but is susceptible of being moved up and down, so as to press with a greater or less degree of force against the burnisher, as may be required. This pressure is regulated by means of a strong spring connected with a pedal below.

As the process of burnishing goes on, the operator draws the sheet forward by a very slow and careful motion, so as to subject all parts of it in succession to the polishing effect of the friction. It requires considerable skill to manage the sheet so as to produce upon it a smooth and uniform gloss. The operator, in holding the sheet, begins in the middle of it, and works first toward the farther

Cases made separately for books bound in muslin.

side by drawing the sheet gently forward as the process goes on. She then turns the sheet, and, taking the half already polished toward her, she proceeds with the operation on the other half in the same manner.

Not only marble paper, but colored papers of all kinds are burnished in this manner.

CHAPTER XVI.

FINISHING.

WHEN books are to be bound in muslin, the covers of them are not formed upon the book itself, but are made and finished separately, and are afterward applied to the book and properly secured. These covers, before they are applied to the book, are called *cases*. They are made in great quantities by a series of separate processes, each workman performing one process upon a great number of covers, and then passing the whole stock into the hands of another workman for the next process.

Thus one cuts out the pasteboard for the sides of the cover by means of the great shears shown in a previous engraving. The frame to which the shears are fixed is so made that the pasteboard is measured by the very operation of cutting it. The workman has only to slide the sheet along as far as it will go, and then cut. He is sure to cut it in the right place without any thought or care. By this plan, the work is not only performed more rapidly and easily, but also far more exactly, than would be possible by any other method of measuring. The sides thus cut, too, are precisely

Cutting out the sides.

Description of the process of gilding.

of the same size, and they are afterward trimmed so square and true that, when they are piled up upon each other on the table, they seem to form, as it were, one solid block, like a block of wood standing on end.

Another workman cuts out the muslin or the leather, whichever it may be, that the book is to be covered with. This operation is performed with so much system, and with such excellent arrangements for facilitating it, that the work is done with astonishing rapidity and precision.

Then the parts of the ease are put together. The back, connecting the two sides, is formed, and the sides are covered upon the outside, and lined within. The case is now finished as to its form, and it is taken into the stamping-room to be lettered, and also embossed or gilded on the sides or back.

In the engraving on the opposite page, a pile of covers or cases, such as are used for the bound volumes of Harper's Magazine, or any other volume of that size, are seen lying on the table in the foreground on the left. Other piles of a smaller size are seen upon the tables, where the girls are at work upon them. The employment of these girls is to apply the gold leaf to the covers in the process of gilding them with the lettering and the ornaments of various kinds with which the backs of handsomely-bound books are usually embellished.

The manner in which these gilded letters and ornaments are made is very curious. To illustrate and explain it, I will take a very simple case. Let us suppose that a book is to have its title —one single word, we will say—put on in gilded letters on the

Mode of applying the gold.

View of the tables



GILDING.

back, and that this word is to be put in letters of such a size that it will occupy a space about half an inch wide directly across the back of the book, at a proper distance from the top. The cover is brought to the table seen in the engraving. One of the girls, with a small piece of sponge, which she has dipped previously in a certain preparation, formed chiefly of the white of an egg, of which

Detailed account of the process of gilding.

Mode of managing the gold.

she has a supply before her ready for use, moistens that part of the cover where the lettering is to come. She then cuts out a strip of gold leaf half an inch wide, and long enough to extend across the back of the book, and places it upon the part which she has moistened. It adheres a little, and forms a gilded stripe across the case in the place where the letters should appear.

This is what the girls are doing at the long table in the preceding engraving. They are putting on strips of gold on all those parts of the cases of the books where the letters or the ornaments are to come. They keep their supplies of gold leaf in the drawers. They have an apparatus, of the form of a little stool, on the table before them, to work upon, and they use a variety of curious implements for dividing and moving the gold leaf, which is so thin and light that the least breath of wind would blow it away. Indeed, so great is the danger of this, that they are obliged to have a sort of screen placed before them on the table, to shelter their work from the accidental draughts which might be produced in the room by an open window, or by persons walking to and fro. This screen consists of some transparent texture spread over a frame. Thus it does not intercept the light, while yet it protects the work from the slightest movement of the air.

But let us return to the cover, which was to be gilded with its title only on the back. When it has had placed upon it the strip of leaf large enough for the title, it is taken to a kind of press to be stamped. In this press is what is called a *die*—that is, a block of metal with the letters of the title of the book cut upon it in relief, precisely as the letters are cut upon the ends of the steel

The die.

Effect of it.

Manner of fixing the gold.

punches used in type-founding, as has already been described. This die is made hot when it is placed in the press by means of steam circulating in concealed channels around it. The case is then slipped in, and it is placed with the face downward under it, and that instant the bed of the press rises by the action of the machinery, and forces the case against the die. Every thing is so adjusted beforehand that, in coming up, the faces of the letters are brought to bear with great force upon the strip of gold leaf which had previously been laid upon the case. There are two distinct effects produced by the operation. First, the substance of the leather or the muslin that comes directly upon the face of the letters in the die is compressed, and an *indentation* is made—one not very deep, it is true, but still very certain and distinct. And, secondly, the heat of the die causes the gold leaf to adhere where it touches—that is, where the faces of the letters come, while it has no effect on the other parts. Thus that portion of the gold leaf which corresponds with the letters is forced, as it were, into indentations in the muslin or the leather, and fixed there by the heat and pressure of the die, while all the rest of it remains at liberty, and may be wiped away by a cloth, or a cushioned brush of soft leather. The cover, when it is first withdrawn from the press, looks very much as it did when it went in, the forms of the letters being at first scarcely visible; but, on wiping away the superfluous gold leaf, they come out fully to view, distinctly defined, and extremely brilliant and beautiful.

One would at first suppose that this must be a very wasteful mode of making gilded letters, inasmuch as so large a portion of

Apparent waste.

The drawer.

Press for stamping and embossing.

the leaf first applied has afterward to be brushed or wiped away. It is true that only a small part of the whole strip which the girl first puts on the cover remains imprinted there by the action of the die, for the space lying between the letters, and above and below them, is much greater than that occupied by the faces of the letters themselves. But then the portion of the leaf that is removed is by no means wasted or lost. The wiping away of the superfluous gold is performed at a table well protected from currents of air, and having holes in it that communicate with a drawer below. The gold leaf that is rubbed off from the covers of the books passes down through these holes into the drawer, and once in three months it is sent to the goldsmith and sold for old gold. So great is the amount of gilding done at this table, that the value of the rubbish, as it might be called, which accumulates here every three months is not less than three hundred dollars, making twelve hundred dollars a year.

The engraving on the opposite page shows the form of the press used for the stamping process just described. It is made very solid and massive, as the force of the pressure which is often required is enormously great. There is a massive top, which is called the platen, the function of it being the same as that of a platen of a printing-press, namely, to stand against the pressure of the bed rising from below. This top is supported, or rather *held down*, by four wrought iron pillars, two of which are seen in the engraving. It is obvious that the chief purpose of these pillars is to hold the platen down rather than to hold it up, for when the bed below rises at the time of stamping or embossing a case, it

View of one of the presses used for stamping and embossing.



EMBOSSING PRESSES.

Necessity of great strength in the press.

Process of embossing

lifts, so to speak, with prodigious force against the platen, and if the columns that hold it were not very strong, and the bolts and screws by which it is fastened to them were not very secure, it would be forced upward bodily and broken away.

The die which contains the letters or ornaments that are to be stamped upon the case is placed in the platen. It is inserted in a receptacle used for it in the under side of the platen, and properly secured there. There is a circulation of steam in channels within the platen, as has already been intimated, which serves to keep the die always hot.

Cases can be stamped in these processes at the rate of sixteen impressions a minute—that is, as fast as a man can put the cases in and take them away; and that without regard to the amount of gilding that may be required, whether it be only a single line, or whether the case be completely covered.

Sometimes the covers of books are embossed with ornamental figures impressed into the leather or muslin without gilding. The patterns for this embossing are cut in solid brass plates of the size of the cover to which they are to be applied. A great number of these plates are seen in the engraving, on the shelves at the end of the room.

When the die for gilding, or the side plate, as the case may be, is fixed in its proper position in the platen, the workman, with a pile of cases at hand, sets the machine in motion, and the bed—that is, the solid mass of iron which forms the central part of the block which the man's hands are resting upon, is forced upward by means of what is called a *knee-joint* below. The position of this kneec-

Operation of a knee or toggle joint.

Great force exerted by it.

joint may be seen in the engraving, underneath the bed of the press. This sort of joint is often used in presses. It is sometimes called a *toggle* joint. The operation of it may be illustrated in this way. Suppose a man to stand with his back against a wall, and then to bend his knees a little forward. Of course, by bending his knees, his head is made to descend. Imagine now that a by-stander pushed his knees in, back to their place, so as to straighten his legs. His head will be forced up again. It would be forced up, too, with great power—that is, provided the man be made of iron, and with no joints in him except those at his knees, and if they are bent only a little. It is true, his head would be forced up only a very short distance, but through that short distance it would rise with great force.

This is exactly the operation of a knee or toggle joint. Look in the lower part of the press in the engraving, and you will see the iron knees. They are bent a little, for the bed of the press is now down. A man is just putting a case in. In a moment the knees will be straightened by means of a wheel connected with a steam-engine acting on a case. The consequence will be, that the bed will be forced upward. It is curious, too, that as the knees become more and more nearly straightened, the force with which the bed rises becomes more and more powerful, until at the last instant, when the knees are just arriving at absolute straightness, it becomes enormous. This ultimate force may, moreover, be regulated at pleasure by bringing the platen down or raising it up a little. The platen, and consequently the die or side-plate which it contains, may be adjusted in this way by means of an apparatus

Mode of regulating the pressure.

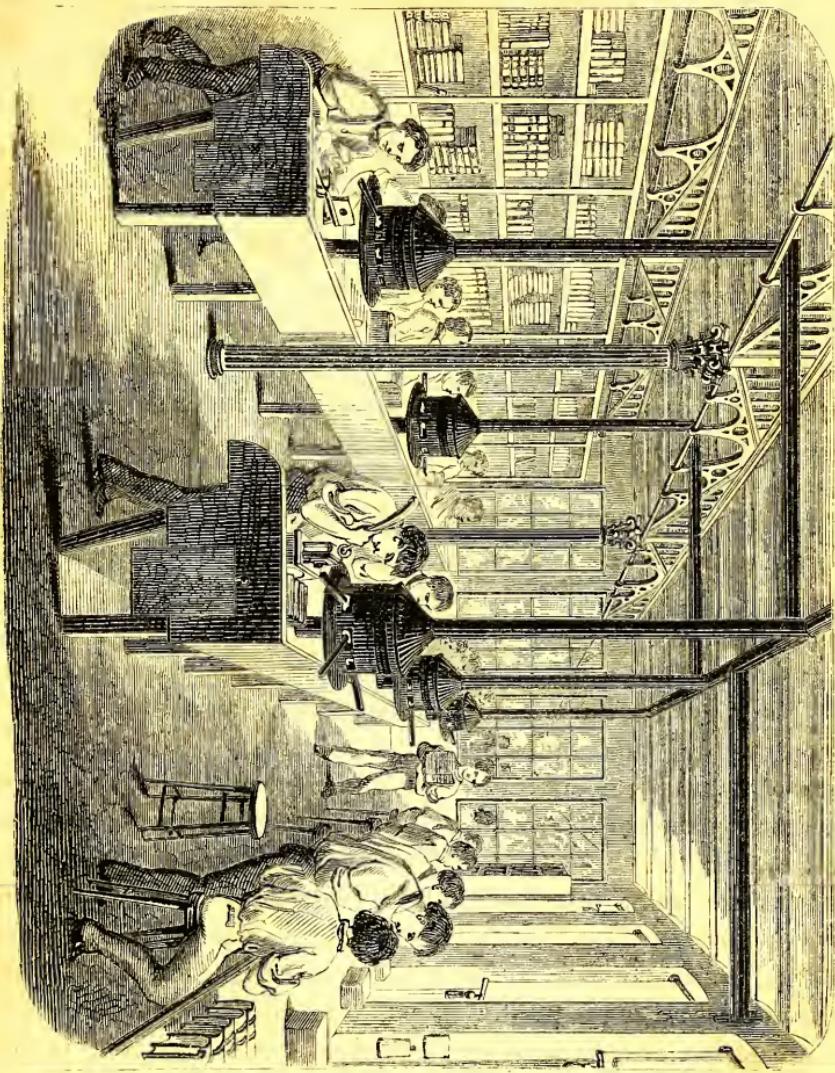
Books bound in leather.

Mode of gilding them.

above. There is a horizontal wheel to be seen at the top of the press, which is connected with a system of wheels and screws so contrived that the workman, by stepping up upon some support, and turning this wheel one way or the other, may raise or depress the platen so as to regulate the pressure that comes upon it at his will. The screws hold it firmly wherever he sees fit to place it.

There are two gauges on the bed of the press, one at the side and one at the end, which regulate the position of the case when it is put into the press, and cause it to take the impression in precisely the right manner.

When books are to be bound in leather, they are finished in a different way. In this case, the bands to which the sheets are sewed are fastened securely to the sides of the cases, and the cases are then covered, lined, and finished while attached to the book. The engraving on the opposite page gives a view of the room where these operations are performed. It is called the finishing-room. The gilding upon the books is applied by hand, though the general principle of the process is the same as in the case of those stamped in the machine. The furnaces seen upon the tables are used for heating the stamps by which the gilding is fixed. The fire in these furnaces is a flame of gas diffused over a considerable surface on the bottom of the furnacee within. The manner of using the stamps in gilding the backs of the books is seen by the position of the figure in the foreground, at the end of the central table.



VIEW OF THE INTERIOR OF THE FINISHING-ROOM.

Necessity of large supplies of books on hand.

CHAPTER XVII.

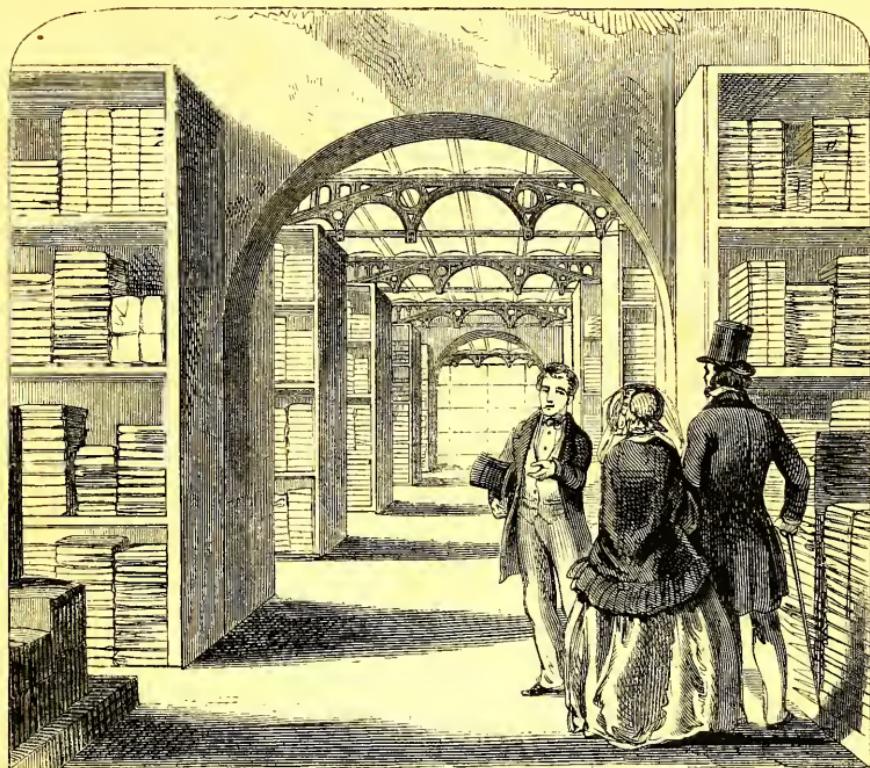
THE DISTRIBUTION.

IN order to have always on hand a sufficient supply of copies of the many hundreds of works published by the house, so as to be able promptly to fill the orders from the trade as they come in, very extensive store-rooms are required to contain the books. In the early part of this volume, an explanation was given of the situation and arrangement of the bins—in number almost a thousand—in which the supplies of finished books are kept; that is, those bound, complete, ready for delivery. But these are not by any means the most considerable portion of the stores kept on hand. The principal part of the edition of any book that is printed is kept in a partially finished state in respect to binding, and is then completed in quantities as copies may be required.

The view on the following page represents one of the ware-rooms where this unfinished stock is stored. It is situated on one of the upper floors of the Franklin Square building, across the court from the sewing-room, which is on a floor nearly corresponding to it in the Cliff Street building. The sheets of each new edition of any work, after being dried, pressed, folded, gathered, and stitched or sewed, so as to be ready to be finished at very short notice, are trundled over one of the iron bridges that leads across the court, and are deposited in this ware-room. They are placed —the sheets of each work by themselves—in bins, similar to those

The stock-room.

View of one of the principal avenues in it.



THE STOCK-ROOM.

used in the ware-rooms for finished work below. These bins are built up from the floor to the ceiling, and stand in ranges, divided by passages that cross each other at right angles, and furnish very convenient access to every portion of the stores. It is only a very small part of the room that is shown in the engraving. There are

Store-rooms for unbound books.

The Magazine.

Immense number of copies.

two principal avenues, one hundred and thirty feet long, passing through it from end to end, only one of which is here seen.

As fast as is necessary, the unfinished books are taken from these bins, in quantities of hundreds or thousands, as the case may be, and conveyed across the bridge again to the bindery to be finished. Then they are sent down by the hoistway to the great sales-room below, to replenish the bins assigned to them there which have been emptied, or nearly emptied, by previous sales.

In this lower store-room is performed the work of selecting and packing the books ordered by the correspondents of the house, and sending them away. Every morning a large pile of letters comes in from the mail from booksellers, committee-men, librarians, directors of public institutions, teachers, and gentlemen in private life, containing lists of the books which they wish the house to forward to them. These lists are handed to the clerks, who proceed to collect the books required for each, and to arrange and pack them.

One of the principal operations of this department is the monthly distribution of the edition of the Magazine, which consists, at the present time, in round numbers, of one hundred and forty thousand copies. Few persons have any idea how large a number this is as applied to the edition of a book. If magazines were to *rain down*, and a man had only to pick them up like chips, it would take him a fortnight to pick up the copies of one single number, supposing him to pick up one every three seconds, and to work ten hours a day.

A portion of the edition of the Magazine, and also of the Story Books, are sent off in bales and boxes to booksellers and agents

View of the office where the Magazines and Story Books are mailed.



THE MAGAZINE CORNER.

who take them in quantities. Others are sent to individual subscribers by mail. The office shown in the engraving, which is situated in the back part of the great room in the Franklin Square building that contains the counting-room, is the place where these copies are addressed, and then mailed in bags sent from the Post-

Authors connected with the Harper Establishment.

Conclusion.

office to receive them. Here, too, all the accounts are kept both of the Story Books and the Magazine.

The authors, whose writings the proprietors and conductors of this establishment bring before the public by the aid of the immense mechanical means and facilities they have at their command, and the still more immense business organization which they have built up, and which extends its ramifications to almost every city street and every rural village or mountain hamlet throughout the land, are very numerous, and they occupy every variety of intellectual and social position. There are classical scholars who pursue their studies in learned libraries, and make profound researches into Greek and Roman lore. There are intrepid travelers, who follow whales in the Pacific Ocean, or lose themselves among the fields and mountains of ice in the Polar Seas. There are clergymen, who instruct the world with their expositions of Scripture, and of moral and religious truth; and statesmen, who discuss questions of politics; and novelists, who invent ingenious tales to furnish amusement and recreation for the weary and the solitary; and tourists, who give accounts of their tours; and ambassadors, who relate the history of their embassies; and multitudes besides. The productions of all these, and of many others, come into this vast establishment each in the form of a single roll of obscure and seemingly useless manuscript, and then, a few weeks afterward, are issued in thousands and tens of thousands of copies, beautifully printed, embellished, and bound, to instruct, entertain, and cheer many millions of readers.

THE END.





.. They wondered who could have written it."

HARPER'S STORY BOOKS.

A SERIES OF NARRATIVES, DIALOGUES, BIOGRAPHIES, AND TALES,
FOR THE INSTRUCTION AND ENTERTAINMENT
OF THE YOUNG.

BY

JACOB ABBOTT.

Embellished with

NUMEROUS AND BEAUTIFUL ENGRAVINGS.

FRANKLIN, THE APPRENTICE BOY.



NEW YORK:
HARPER & BROTHERS, PUBLISHERS.

LOSSING - BARTLT

Entered, according to an Act of Congress, in the year one thousand eight
hundred and fifty-five, by

HARPER & BROTHERS,

in the Clerk's Office for the Southern District of New York.

P R E F A C E.

MANY of the stories in this series are narrations of imaginary incidents, designed to illustrate or enforce some moral truth, or to convey some useful information. Others are historically true. The present volume is of this latter class. Those who read it may feel assured that every thing which is stated in it is literally and exactly true.

The way in which these minute particulars became known in respect to the early life of the great philosopher, was through a narrative of them which he wrote himself, in the latter part of his life, and which is known in the world of letters as the Autobiography of Benjamin Franklin. A *biography*, simply, is an account of the life of any person. An *autobiography* is an account of the life of any person, written by himself. It is an excellent thing for any intelligent boy, who is so far advanced in his education as to write a tolerably fluent and uniform hand, to compose a history of his childhood, in which he will narrate, in a clear and copious manner, the incidents and adventures, the difficulties and the mistakes, the joys and the sorrows of his earlier days. Girls can do this too, and in some respects even more advantageously than boys. By writing half a chapter every week, the work

would be finished in a winter, and it would not only be a great means of improvement to the writer, as a literary exercise while performing it, but it would be a great source of entertainment and pleasure to him to read it in the later years of his life.

The proper mode of executing the work would be to make some particular scene, or incident, or adventure the subject of each chapter—to write the account of it very fully, inserting all the interesting particulars, and recording the conversations and dialogues that occurred—and then after carefully revising and correcting the composition, to transcribe it with great care in a suitable book procured for the purpose. A *very* ingenious boy or girl would embellish the work, perhaps, with little maps or plans illustrating the narratives, or with sketches in pencil, or in ink, of the places or objects referred to in the story.

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F R A N K L I N,

T H E A P P R E N T I C E B O Y.

CHAPTER I.

WHY WE CELEBRATE THE FOURTH OF JULY.

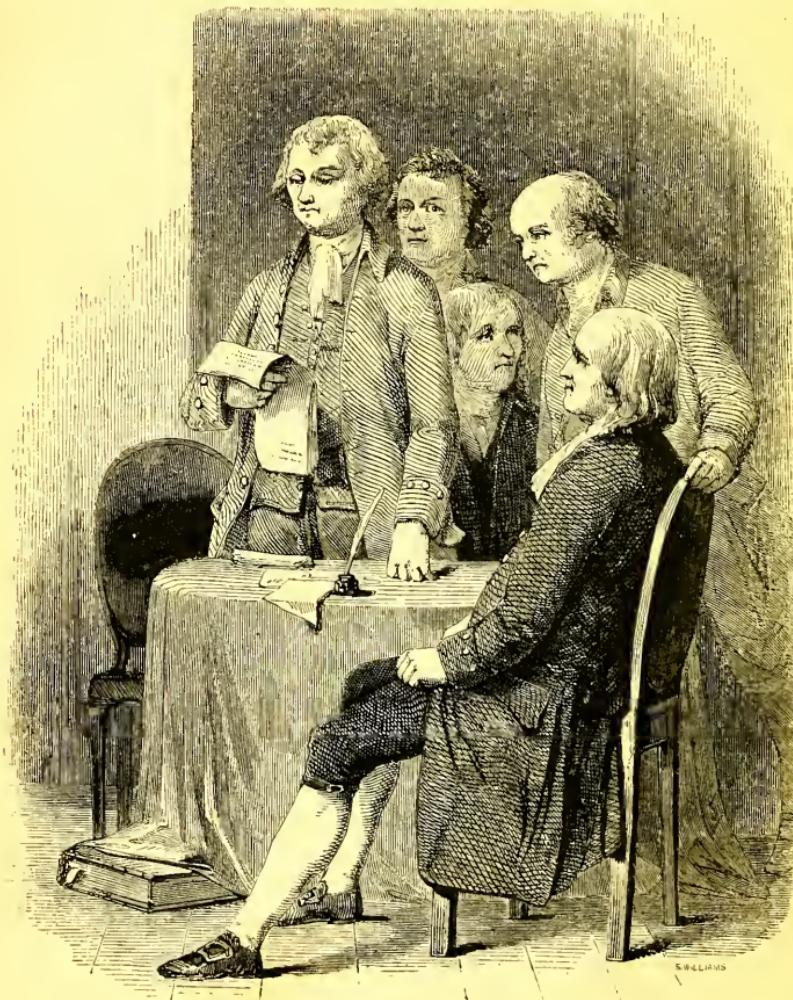
Origin of the American Revolution.

The true cause of it.

BENJAMIN FRANKLIN was one of the most distinguished statesmen of America at the period of the Revolution. The Revolution took place about seventy-five years ago.

Before the Revolution, all the states of America were colonies of England. They were ruled by governors that were sent out here from England. The American people quarreled with these governors, and with the rules and laws which were made for them in England, and, finally, the quarrel became so great that they determined that they would be independent of England altogether. They made various complaints against the government which the English had exercised over them, and yet it is probable that, while they were colonies, they were really ruled as well as most other nations were ruled in those days. The true reason for the Revolution, after all, was not so much that the colonies were governed badly by the English, as that they did not choose to be governed at all by a foreign nation, three thousand miles away, but preferred rather to govern themselves. This was a very good reason.

The Committee of Congress preparing the Declaration of Independence.



Names of the members of the committee.

To prevent the possibility, therefore, of a tie in a committee, it is customary, as has already been said, to have the number of members odd. Then there will always be a majority on one side of the question or on the other.

So there were five men appointed on this committee. They were all men of great influence and distinction. The committee met, and held a consultation in respect to the manner in which the Declaration of Independence should be drawn up; and, when they had agreed upon this, they appointed one of their number, Mr. Jefferson, to write the first draft. When he had made the draft, the committee came together again to hear it read, in order to see if they had any alterations to make in it before reporting it to Congress.

In this picture we see the committee assembled to hear Mr. Jefferson's draft read. The man who is reading it is Mr. Jefferson. This Mr. Jefferson was afterward made President of the United States when the independence of the country was established. The rest are listening. They are listening very attentively. They are considering not merely how they like the Declaration themselves, but also how the people will like it; for, in making such a declaration, Congress would be speaking, not for themselves, but for the inhabitants of all the thirteen colonies.

They are also considering what the government and people of England will be likely to think of the reasons they give why the colonies should separate from the mother country, and what all the other nations of the earth will think of them. In fact, the preparing of this declaration was a business of the most momentous and solemn character. These men feel it to be so, as is evident

The several members of the committee described.

from the very serious and earnest expression of countenance which they manifest on hearing it read.

The man who sits in the chair in the foreground is Franklin. He was a member of the committee. The one behind him, with a head nearly bald, is John Adams. He was a very distinguished man in those days, and he too, as well as Jefferson, was afterward chosen President of the United States. The names of the other two are Sherman and Livingston.

Observe the dresses of these men. How different they are from the present fashion! What long vests and curiously cut coats! The stockings are long too, and the shoes are fastened with great buckles.

There is an inkstand and a pen upon the table. This is because there may be some alteration that they may wish to make in the draft of the Declaration.

The result of this consultation was, that the committee approved of the draft which Mr. Jefferson made, and in a day or two they read it in Congress. Then there followed a long debate. Some were in favor of adopting it, and so separating this country from England forever. Others thought it best not to separate. When, at length, the time came for voting, it was found that, out of the thirteen colonies, nine were for adopting the Declaration, and four, for various reasons, were unwilling to vote for it. At length, however, after some farther consultation and discussion, they all agreed to it. Congress adopted it, and all the members signed it but one.

The day on which Congress adopted and signed the Declaration happened to be the Fourth of July, and accordingly, ever

The Declaration of Independence.Complaints against the English government.

since that day, the Fourth of July has been celebrated in America as the birth-day, as it were, of the nation. It is called sometimes Independence Day, because it was a declaration of *independence* that Congress adopted.

The Declaration of Independence, as adopted by Congress, consisted in a great measure of complaints against the English government in respect to their management of the colonies, and the statement of these complaints was very probably, as is usual in such cases, more or less exaggerated. The Declaration used to be read for many years every Fourth of July as a part of the celebration of the day ; but this practice is fast going out of use, for nobody cares any thing now about those old quarrels. Besides, the whole generation of English people that were alive in those days has passed away, and a new generation has come upon the stage that are very friendly to the Americans. There is, therefore, now no longer any use in keeping up the memory of the complaints which our fathers made against their fathers. It is much better to place the independence of the United States of America on the ground that every great community of people have a right to the management of their own affairs so soon as they become sufficiently extended, organized, and powerful to take it. On this ground, all the nations of the earth now admit the rightfulness of the independent government of America, and the particular disputes and quarrels which happened to attend the separation are no longer of any consequence. It is better to forget them.

Picture of Franklin carrying candles.Franklin the statesman.

CHAPTER II.

THE CHILDHOOD OF FRANKLIN.



HERE is a picture of Franklin doing errands for his father when he was a small boy. He is carrying some candles home to a customer; for his father, you must understand, kept a candle shop, and Benjamin used to carry the candles home to the customers when they bought them.

And now here is another picture of him,

representing him as he was in after life, when he became a great statesman, and was employed by government to write dispatches, and negotiate treaties, and to perform other great public functions.

Observe how great is the difference. In the one case he is a small boy; in the other, a full-grown and venerable man. In the former, his face beams with light-heartedness and gayety; in the other, it wears the expression of thought, of weighty



A great difference.

Franklin's father a candle-maker.

responsibility, and of care. The boy is erect, elastic, and full of vigor, and his eyes are bright and beaming. The man is bowed with age, and his sight is dimmed, so that he must wear spectacles to enable him to see. The boy has a mind that is fresh, active, and vigorous, but it is undeveloped. He has laid up little knowledge, and his judgment is immature. He can carry candles about, it is true, for that requires but little thought. The man, on the other hand, has a mind that is matured, and stored with a thorough and intimate knowledge of the vast expansion and intricate details of national affairs. He is drawing up a treaty, perhaps, or arguing some national cause on which the welfare of millions of families depends.

Your father, reader, is perhaps an independent and thriving man, with constant and profitable employment, and an income sufficient to enable him to provide abundantly for all the wants of his family. There are carpets on the floor in your house, and curtains at the windows, and books upon the shelves, and the children can all go to the school to be instructed. Now it is very probable that it is owing to some of Franklin's negotiations or treaties, or to some of the constitutions or laws which he helped to frame, that your father, and thousands of others, are in so prosperous a condition. Had it not been for him, and for other statesmen like him, a vast number of the people of America, who are now prosperous and happy, might have been poor day-laborers, living, like the peasants of Europe, in wretched huts, and toiling all the time merely to get food enough to keep them alive from day to day.

Franklin's father was a candle-maker. He lived in Boston. The place where he lived was near the head of Milk Street. He lived in a small wooden house, which has long since been taken.

The birth-place of Franklin

Picture of the family.

down. The people, however, who took it down remembered that Franklin was born there, and, many years afterward, some wealthy merchants built a block of granite stores upon the place, and they put an inscription on the buildings, in very large letters, cut in the stone, near the top of the building, **BIRTH-PLACE OF FRANKLIN**.

If you ever visit Boston, go to the head of Milk Street, to the side-walk before the Old South Church, and walk down a little way, looking to the top of the buildings on the other side, and you will see the inscription there.

It was here, therefore, that Franklin spent the first years of his life. He used to work in his father's shop, helping to make candles. His part was to cut the wicks and prepare the moulds. Then, when there were errands to do, he was sent to do them. He lived, of course, at home all this time with his father and mother. Here is a picture of the family.



Franklin's brother and sisters.Advantages enjoyed at the present day.

Young Benjamin is leaning back against the table, listening to his father, who is playing some tunes on the violin. His father was a very good musician, and Benjamin, as well as all the other members of the family, used to like very much to hear him play. Even the little child that you see on the right, leaning upon her mother's lap, seems to be listening very intently. She is Benjamin's sister. Benjamin had two sisters younger than himself, and he had quite a number of brothers and sisters that were older. They are not represented in the picture, for at this time they had most of them grown up and gone away.*

Now how was it that Franklin, being a mere message-boy, carrying candles, a pound at a time, about the village of Boston—for Boston was then only a village—became so great a statesman and philosopher that his usefulness, influence, and fame extended over the whole civilized world.

We shall see.

CHAPTER III.

SELF-INSTRUCTION.

BENJAMIN FRANKLIN had very few opportunities of learning, except what he made for himself. Boys at the present day generally spend their time in early life in going to school, where they have every necessary convenience for learning, and good instruction. Franklin, on the other hand, was obliged to study without

* Upon the table are writing materials, and underneath it is a stool of the proper height for Benjamin, when sitting at the table and learning to write.

Choosing a trade.

Franklin decides to become a printer.

conveniences and without instruction. It is true he went to school for a while at first. His father sent him, and he was very glad to go. He learned in this way to read and write, and so made a beginning.

One of the first things which afterward indicated the desire which Franklin felt to cultivate his mind, was the preference he expressed in regard to the business which he should follow. He told his father that he would rather have some other business than that of a candle-maker. His father proposed several other trades to him, and walked about Boston with him a great deal to see the different shops, in order that he might compare one trade with another, and determine which he would prefer. He finally decided upon being a printer, because he thought that in this business he should see a great many books, and have opportunity to read and study them. It is true that he would have to work

nearly all day in the printing-office, but then he thought that he could take the books home with him at night, and read them in his room, and also that he could read them at noon, when he was eating his dinner.

Here is a picture of Franklin reading his books at night, when he was serving as an apprentice in a printing-office. He used to borrow the books of the boys

that were employed in the book-stores of the town. These boys



Franklin borrows books to read.

The boy and the pitch-pine knots.

were accustomed to come to the printing-office where Franklin worked with errands from the booksellers, and so he got acquainted with them. They used sometimes to lend him books out of the book-stores. In such cases, Franklin would be very careful of the books so borrowed, and sometimes he would sit up almost all night to finish reading one which he thought he must return the next morning. This was not a good plan. It is a great deal better to do what we have to do in regular hours. It endangers the health and the eyesight to sit up late at night, reading and studying.

I have known some boys who had even greater difficulties than these of Franklin's to contend with in acquiring knowledge. One that I knew lived in a log-house, and his father and mother had no candles. So he made torches of pitch-pine wood, by splitting up the wood into long, slender bars. He would light one of these torches in the fire, and then insert the end of it into one of the crevices between the stones of the chimney. This was the only way that he could have any opportunity to read and learn, for during all the day-time he was obliged to work on his father's farm.

This boy had only a few fragments of books. With these he taught himself to read, after his mother had taught him his letters. He had a part of an Arithmetic, and in learning to cipher with this, he used a board for a slate in doing the sums, and a piece of chalk for a pencil.

Observe in what a plain and humble style Franklin's room is furnished in the picture. He is seated on a stool, with a table before him, and one candle. I suppose he got his candles at his father's shop. His bed is seen indistinctly in the background.

Franklin eating his dinner in the printing-office.

Franklin used to read, too, at noon, in the printing-office, while he was eating his dinner. He used to buy his own dinner, and eat

it at the office, so as to be able to read while he was eating it. He had no meat at his dinner, but only bread; and he drank nothing but water. You can see the pitcher that contained the water on the table in the picture. The table and the stool are very plain, such as they would be likely to have at a printing-office. The stool was a high one, made to stand before a high desk, and Franklin, being not yet very tall, could not put his feet down to the floor, so he put them upon one of the rounds.

The books which he read on these occasions were not story-books altogether, but books of solid instruction. One of the books which he took most interest in was "Locke on the Human Understanding," a book which a boy of his age must read and study very attentively indeed in order to understand it at all.

The printing-office where Franklin served his apprenticeship



The newspaper.Advantages of writing composition.

was his brother's. His brother was a great deal older than he was, and there was very little friendship or sympathy between them.

There was a newspaper printed in the office, and Franklin used to read it very attentively, and observe very carefully how the articles were written. He used also to write himself sometimes, in order to acquire practice in expressing his ideas upon paper, knowing well of what great value the power of writing in a forcible and ready manner would be to him when he became a man. Sometimes he would write down his opinions on some subject which he had been reflecting upon, at other times he would write arguments in favor of some principle which he thought he could prove to be a true one. He wrote poetry, too, by taking some little story and turning it into verse. There is nothing more excellent that a spirited boy, who wishes to improve his mind, and increase his future power as a man, can do, than to practice composition in this manner. Unfortunately, however, most boys, and even many girls, at the present day, are very averse to such an exercise. Not only do they never attempt it themselves of their own accord, but when their teachers assign it to them as a duty, instead of undertaking it with alacrity and pleasure, and doing the best they can, they make all manner of resistance, and try all possible means of escaping from the task.

Franklin once concluded to write an article for his brother's paper. So he chose some subject which he thought would be suitable, and wrote his thoughts upon it, taking care to express them in as plain and forcible a manner as possible. When his article was finished, he copied it carefully, disguising his hand as

Franklin's anonymous communication.

Effect produced by it.

much as he could, and then slipped it in, one night, under the office door, where his brother found it in the morning.

His brother read the communication, and liked it very much. Now it happened that there were several gentlemen of Boston who had taken a great interest in the paper, and who used to write for it themselves, and to come to the office sometimes to consult about the articles that were to appear in it. Two of these gentlemen happened to call in on the morning that Franklin's article was found, and his brother showed it to them. He told them that he had found it under the door. He read it to them. They were much pleased with it, and wondered who could have written it. All this time Franklin was close by, standing at the case where he had been setting up type, and he heard all they said about his article.*

You can see by the picture what is the nature of the arrangement which they make for setting up types in a printing-office. The types are put in a *case*, as it is called, which is divided into small compartments. Each kind of type is in a compartment by itself. There are always two of these cases, one above the other, and these are placed as you see them in the Frontispiece, on the right. The workman has the sheet of paper which contains what he wishes to print, set up before him at the top of the case. You can see the sheet that Franklin is printing from, pinned up at the top of his upper case. The workman looks upon his sheet and sees what the word is, and then spells it out by taking the types from the proper compartments. The types are about an inch long, and each one has the form of its letter projecting at one

* See Frontispiece.

Process of printing.

The cases.

The composing-stick.

end of it. The workman takes these types out, and arranges them in a little frame which he holds in his hand. This frame is large enough to hold eight or ten lines, and sometimes more. When it is full, he puts what it contains in a larger wooden frame, and then sets up some more types, until at length he gets enough for a page. Then he ties a string around the page, to keep the types from falling down, and puts the whole on a solid table, which has a stone or iron top, and then proceeds to set up another page. So he goes on until he has pages enough for a whole sheet of paper.

When he has got all these pages arranged, he puts a heavy iron frame over them, and wedges the pages very tight, each in its own compartment of the frame. You will see two of these frames full of types in another picture by-and-by, and Franklin carrying them up stairs. They are very heavy, for the types are made of metal, and when so many of them are set up together, it makes a very heavy mass.

Of course, when these great frames are put upon the printing press, the types that make up the pages are all standing up in the pages *endwise*, with the letters on the upper ends of them. It is necessary to make sure that the lower end of all these types are down upon the stone, so as to have the faces of the letters all on the same level. To do this, they put a block on over the faces of the types, and then strike on the top of the block gently with a mallet. You can see Franklin's mallet hanging by his side, just below the case. It hangs by a string attached to the handle.

When the pages, thus wedged into their great frame, are properly placed upon the press, the workman inks the faces of the

Danger of hasty judgments.Good and bad characters.

types all over in a peculiar manner, and then lays the sheet of paper on, and presses it down strongly. This prints the forms of all the letters upon the sheet of paper.

If any of the letters are placed wrong, the word will of course come wrong on the sheet. Hence, to be a good printer, one must be a very careful man.

CHAPTER IV.

QUARRELING.

In story-books and tales written to amuse the reader, the characters are generally either entirely good or entirely bad. But in real life it is not so. In human nature, as we see it in living reality around us, the good and bad are always more or less mixed together. The best people have some bad qualities, and sometimes act wrong, while the worst people have many good qualities, and sometimes act right and nobly.

Wise people are aware of this, and so, when they see any one who, upon first acquaintance, seems very good, they do not allow themselves to get too extravagant in their admiration of him.

“When we come to know him better,” they say to themselves, “we shall very probably find that he has some faults.”

In the same manner, when they see a man whose character appears to be bad, they do not allow themselves to condemn him in too absolute and unqualified a manner.

“If we were to know him better,” say they to themselves, “we should find that he had some good qualities.”

Franklin's faults.

His desire to go to sea.

Anxiety of his parents.

Foolish people are not so considerate. They condemn altogether, or they commend altogether, forming their judgment from the first indications they see.

What we have said thus far about Franklin has been all in his favor; but he had, at this time of his life, some very serious faults, which he was afterward fully aware of, and greatly lamented.

He was somewhat vain and self-willed, and before he went to his brother's printing-office he made his father some unnecessary trouble by his insubmissive behavior. He had a great desire to go to sea. A great many boys of his age who live in sea-ports, and see the vessels going out and coming in, are inspired with that desire. They find the confinement of school and the restraints of home very irksome, and they wish to go to sea, where they imagine they shall behold a thousand new and strange things, and enjoy great liberty, and that for duty, there will only be such things as climbing up the rigging now and then—and climbing is, of all things, exactly what they like best to do. At home they are very often not allowed to climb.

Although Franklin made some resistance to the plans of life which his father formed for him, and gave both his father and mother a great deal of anxiety and trouble by persisting a long time in his desire to go to sea—so much so, that at one period they were much afraid that he intended to run away, and felt it necessary to watch very vigilantly to prevent him—still, in the end, he concluded to yield and to go to the printing-office; and here, for a time, he became so much interested in his books and in his writing, and in the paper which his brother published, that

Franklin becomes somewhat self-conceited and vain.

he was pretty well contented. He, however, was still somewhat vain and self-willed, and his success in writing articles for the paper, and in other such things, made him more so. At one time he wrote some little ballads and songs, and other similar pieces of poetry, and they were so well written that his brother had them printed on small sheets, and then sent Benjamin out to sell them. They sold extremely well, chiefly, perhaps, because they related to events that had recently taken place, and in which all the people were interested. The success of these attempts, however, made Benjamin more vain and self-important than he was before.

In fact, all boys that are possessed of good natural abilities are almost always, at some period of their youth, a little self-conceited and vain. They find their powers of mind becoming stronger and stronger as they grow older, and their knowledge extending, and so, comparing themselves as they are now with what they were a few years ago, they see a great improvement ; and they fancy that there is something quite extraordinary in their attainments and in their capacity. In such cases they lose their interest in acquiring more knowledge, and are chiefly pleased with opportunities of showing off what they have already acquired. They evince sometimes great zeal and ardor in certain studies at school, but it is almost always in such studies as they can make the most display in, not those in which they have most to learn. They like to do the things which they think they can already do well, not to learn new things, and they become very impatient of all direction and control. In fact, they often manifest a degree of self-importance and self-conceit that is quite ridiculous.

Dreadful quarrels between Franklin and his brother.

If Mr. James Franklin—for that was the name of the printer, Benjamin's brother—had been a man of good temper and gentle manners, perhaps things would have gone on quietly, notwithstanding Benjamin's faults and errors, until he should have got cured of them. But Mr. James was a violent man himself, and instead of taking a course with his brother calculated to win him back to his duty, he used to scold and upbraid him in the most harsh and violent manner, and sometimes, when Benjamin retorted,



they would have very terrible quarrels in the printing-office. In these quarrels both the brothers were very much to blame.

Some account of the apprenticeship system.Apprentice boys useless for a time.

CHAPTER V.

CAUGHT IN HIS OWN TRAP.

THE contention between Franklin and his brother led, finally, to a serious difficulty, which resulted at length in Benjamin's running away. As is usual in cases of this character, both parties were greatly to blame.

In order that you may understand this case fully, I must begin by explaining something about apprentices and journeymen.

When a boy enters as an apprentice with a mechanic to learn a trade, his father comes under an obligation for him that he shall remain with his master a certain number of years—usually until he is twenty-one years old. This is perfectly fair. In fact, the apprenticeship would not be fair without such an agreement, because, when a boy goes first into the shop, the master has to pay all the expense of his board and clothing, and to spend some time in teaching him the trade, without getting any benefit from him at all, or at least very little; for the boy, at the beginning, knows, of course, nothing about the business that he is learning, and so he can not do any thing to advantage. Perhaps he even does mischief, by injuring the tools, or spoiling the materials that he is working upon. A careless boy, for instance, in a printing-office, by breaking down a *form*, and spilling the types all together on the floor, might do more mischief in one minute than he could repair in a week.

Thus boys, at the beginning, are of very little service to the

The indenture.Edict against Mr. Franklin's newspaper.

mechanic who takes them as his apprentices. He takes them on the faith of their promise that, after they have learned the trade, so that they can be of some use to him in his shop or office, they will remain and work with him till he is repaid. The father of the boy accordingly enters into an agreement for him that he will remain, and an honest and true-hearted boy will fulfill such an engagement as faithfully and as willingly as if he had made it himself.

The agreement which is made between the father of a boy and the master into whose shop he goes to learn his trade is written upon a paper, and is called the *indenture*. A boy thus bound is called an apprentice, and sometimes an indented apprentice. After his time is out, if he continues to work for his master, he receives pay, and is called a journeyman. The indentures made in the case of Benjamin Franklin were a little more favorable than is usual in such cases, for it was agreed in them that he was to have pay as a journeyman for the last year that he should stay—that is, the year before he should be twenty-one.

Things went on tolerably well under these indentures until Franklin was about seventeen years of age. At that time, Mr. James Franklin inserted in his newspaper an article against the government. This offended the government, and Mr. Franklin was put in prison for it; and before they released him again, they made an edict that "Mr. James Franklin should no longer publish the New England Courant."

The New England Courant was the name of the newspaper.

Mr. Franklin was, of course, very glad to get out of prison. He was still, however, in trouble on account of this edict. His paper

Mr. Franklin's cunning scheme for evading the edict.

was profitable, and he was very unwilling to give it up. At first he thought that he would change the name of the paper, and then go on printing it as before. Then, if the officers of government should call him to account for disobeying their edict, he could say that he was not printing the New England Courant, but another paper. But then such a change of the name might make him a great deal of difficulty, he thought, with his subscribers ; for, suppose he were to change the name from the New England Courant to the New England Sentinel, for example, and then, at the end of the year, were to send in bills for the New England Courant, they might say that they had not received the New England Courant, but the New England Sentinel ; and, on the other hand, if he were to send in bills for the Sentinel, then they might say that they did not subscribe for the Sentinel, but only for the Courant, and that they were not bound to pay for any other. So there were great difficulties in the way of changing the name.

Presently Mr. Franklin thought of another plan, which was, to continue the paper under the same name, but to pretend to sell it to Benjamin, and thus let him be nominally the proprietor and printer of it ; for the edict was, not that the paper should not be printed, but that *Mr. James Franklin* should not print it. This plan was finally agreed upon. Benjamin himself had, of course, no objection to it, for it brought his name forward more prominently before the public, and made him appear like quite a man. So the plan was decided upon. Mr. James Franklin's name was left off from the paper, and Benjamin Franklin's put on, and very proud was Benjamin to see it there.

There was one trouble about this arrangement, or, rather, one

Mr. Franklin gives Benjamin a release.Endorsing.

danger ; for, as long as Benjamin was James's indented apprentice, the government might say, if they undertook to inquire into the reason why the publishing of the newspaper was not stopped, that Benjamin was only a boy—an apprentice merely, of James's—and that, consequently, the idea that he could be really the printer and proprietor of the paper was only a pretense, and was perfectly absurd. In order to be prepared to meet that difficulty, Mr. James proposed to *cancel* the indentures by which Benjamin was bound to him.

"I will write on the back of the paper," said he to Benjamin, "that I release you from being my apprentice, and give you your liberty from this time. Then you can show them that release, in case they should say that you are an apprentice still. In the mean time, we will go on just as if the indentures were not altered. You shall still be my apprentice in reality, just as much as before. I trust to your honor to keep the agreement the same, notwithstanding this release, which is only for form's sake."

Benjamin agreed to this, and so Mr. James took both indentures, and endorsed the papers* as follows : "I hereby release the within-named Benjamin Franklin from all obligations arising from these indentures, and declare him to be his own master from and after this date"—or words to that effect.

Thus all was arranged, and they went on publishing the paper

* To endorse a paper is to write something on the back of it. *Dorsum* is an ancient word meaning back. The fin on the back of a fish is called a *dorsal* fin. There are a great many different ways of endorsing papers. One of the most common ways is for a man to write his name on the back of a note, and this puts him under obligation to pay the note in case the man who signed it can not or will not do it. In such case a man is said to *endorse* for another.

Objections to this scheme.

Some advice for both boys and men.

at the office, with the name of Benjamin Franklin inserted conspicuously under the title of it as the printer and proprietor.

Now this plan, ingenious as it undoubtedly was, and at the outset promising, was still a very dangerous one for Mr. James Franklin to adopt. In the first place, it is always unwise and unsafe to attempt to accomplish any thing by trickery and false pretenses. I advise all the readers of this book to resolve that, both now while they are boys, and hereafter when they come to be men, they will be open, honest, and direct in all their plans and undertakings, and not attempt to do any thing by means of artifices, tricks, and evasions, however ingenious and plausible such contrivances may sometimes seem. Then, besides, Mr. Franklin, by canceling the indentures, put himself wholly in Benjamin's power, having released him from all legal obligation to fulfill his agreement. Now you will find, when you come to be men, and have dealings with men, that if you release them from all legal obligation to do as they agree, and trust entirely to their honor, they will indeed very probably go on faithfully fulfilling their agreements so long as no unexpected occurrence or difference of opinion between you and them takes place. But, so soon as there is any such disagreement, you are immediately involved in difficulty, for they will say that in something or other you have not done as you ought to do, and so they will refuse to keep their covenant. They will pretend to be released from it by some fault, real or imaginary, in you. In such cases you have no redress, for you have given up all legal hold upon them, and, consequently, if they will not voluntarily keep faith with you, you have no redress.

Benjamin Franklin and his brother got into difficulty in precisely

Quarrel between Benjamin and his brother.They separate.

this way. Some months after the canceling of the indentures, they had one of their old quarrels in the office, and Benjamin, being angry, said "he would not stay in the office any longer to be so abused." His brother retorted that "he did not abuse him, and did not wish to abuse him; he only wished him to do his duty, as he had agreed." Benjamin said that "the indentures were canceled, and, though he would not have taken advantage of that to go away if his brother had treated him as an apprentice ought to be treated, still, as it was, he was determined not to stay any longer. He would go to some of the other printing-offices in Boston," he said, "and work as a journeyman in them."

Mr. James Franklin determined to prevent this; so he went around to all the other offices, and made to the master of each a statement of the difficulty between him and Benjamin, and asked them not to employ him. They said that they would not. They thought it very dishonorable in a young man to take advantage of such a canceling of his indentures to break his engagement, and they determined not to encourage such gross injustice. Benjamin, when he found that he was refused wherever he made application, and that he was reproached, too, with his dishonorable conduct in going away from his brother, was very much perplexed. He did not know what to do.

He thought, very naturally, of going to some other place. The nearest place where there was any printing done was New York. He concluded that he would like to go there, if he could get there. The journey from Boston to New York is now very easily made. You can go in a few hours. In fact, you can leave Boston at four o'clock in the afternoon, and get to New York before half the

Collins helps Benjamin to form a plan for running away.

people of the city have gone to bed. In Franklin's time, however, it was more like what a journey to California is now. The route by land was through a wild and unsettled country, and there were no public conveyances. Besides, to set off on such a journey would require considerable preparation ; and Franklin had reason to believe that his father, if he knew of his having such a plan, would take steps to prevent his executing it ; so he did not know what to do.



While he was in this perplexity, one of his companions, a very intelligent and active, but rather a bad boy, proposed a plan to him for getting away. There was a vessel in the harbor going to New York soon, and Collins told Franklin that he thought he could get the captain to take him secretly, by making up a false story to deceive him.

"I will tell him," said he, "that the reason why you wish to go away is, that your parents insist on your marrying a girl that you do not wish to marry, and that they will prevent your going if they find it out. Then he will let you come secretly, and hide in his vessel, just before he is ready to sail."

This plan was adopted. Franklin sold some of his books to raise money, and made all the other necessary preparations in the most secret and stealthy manner, so that nobody suspected his

He goes away in a vessel.

Grief of his parents.

design. He got on board the vessel, and sailed away. His father and mother knew nothing about it until he was gone, and then they were almost broken-hearted. He was their youngest son, and they loved him dearly. He had given them before a great deal of anxiety and trouble, and now, finding that he had broken his engagements, and disgraced himself and his family by running away from home, their hearts were filled with grief. Franklin himself afterward admitted that he acted very wrong in these transactions.

Although Franklin ultimately succeeded very well in his plans, and became very prosperous, his success was probably retarded and diminished by his thus running away from home, and not promoted by it. If he had remained with his brother, and honorably fulfilled his obligations as apprentice, there is every reason to suppose that he would have risen to eminence in Boston even more rapidly than he did in Philadelphia, and he would in that case have spared himself the many hardships, privations, and sufferings which he endured, and particularly the remorse which subsequently stung him so severely, when he thought of his undutiful conduct toward his father and mother.

Franklin's father and mother were much to be pitied in thus losing their beloved son, but Mr. James Franklin deserved no sympathy in losing his apprentice, for he got caught in his own trap.

Franklin traversing the State of New Jersey.

CHAPTER VI.

HARDSHIP AND SUFFERING.

HERE is a picture of Franklin traveling on foot, and hurrying along to escape from the rain. He has a stick and a bundle. He

is carrying his bundle over his shoulder by means of his stick. He is tired of carrying it in his hand. It has been raining. The roads are wet and muddy, and it is hard to walk on them. But more rain is coming, and so he must hurry on.



Franklin was in the State of New Jersey at this time. If you look upon the map, you will see that the State of New Jersey is beyond New York, reckoning from Boston. You will also see that, in order to get into New Jersey from New York, it

is necessary to cross the mouth of the Hudson River, which is there very wide. It is necessary to cross this river, because New Jersey is on the south side of the river, while New York is on the north side of it.

How came Franklin to be beyond New York, on the farther side of the Hudson River, and to be traveling thus in a storm in New Jersey?

How Franklin came to be going to Philadelphia.

The route.

Burlington.

He was going to Philadelphia.

And how came he to be going to Philadelphia ?

This was it :

When he got to New York, he could not find any employment in the printing-offices there. New York was then a small town—smaller than Philadelphia—and there were not many printing-offices there. In fact, there was not much printing to be done in that city. The printers had workmen enough ; but one of them, an old gentleman by the name of Bradford, told Franklin that he had a son in Philadelphia who was a printer, and who had just lost his foreman, and he recommended to Franklin to go there.

Franklin immediately determined that he would follow this advice.

If, now, you look at the map of the United States, you will find that to go from New York to Philadelphia by sea requires quite a long voyage. You have to sail down the harbor of New York, between Staten Island and Long Island, till you get to the sea, then along the Jersey shore, in a southerly direction, till you get to the mouth of Delaware Bay, then west, up Delaware Bay nearly fifty miles, to the mouth of Delaware River, then up the Delaware River thirty or forty miles to Philadelphia. Thus it is a long way round.

But by land the distance is not by any means so great. First you have to cross the mouth of the Hudson River, which is here about two miles wide. Then you travel by land across the State of New Jersey till you come to the Delaware River above Philadelphia. The place where you come to the river is Burlington. From Burlington you go down the river direct to Philadelphia.

Modes of conveyance from New York to Philadelphia.

Amboy.

There are now two good rail-roads across the State of New Jersey from New York to Philadelphia. In Franklin's day there was not even a stage-coach.

There are now, moreover, three good steam ferries across the North River from New York to the Jersey shore. In Franklin's day there was no ferry. The only way to go across was by a sail-boat or a row-boat.

Franklin concluded to put his trunk on board a vessel, and send it round by water to Philadelphia, while he himself went across the country by land. He put all his clothes into the trunk, except a very few, which he thought he might require by the way. These he tied up in a bundle.

Then, finding a small vessel going across from New York to Amboy, on the Jersey shore, he took passage in it, and set sail.

There were a number of other passengers going in this vessel, although it was very small. In fact, it was rather a sail-boat than a vessel—a very safe and sufficient craft, no doubt, for sheltered seas and fair weather, but altogether unfit to encounter gales of wind and heavy seas. There was apparently not much danger, for the voyage to Amboy was to be made inside the land all the way.

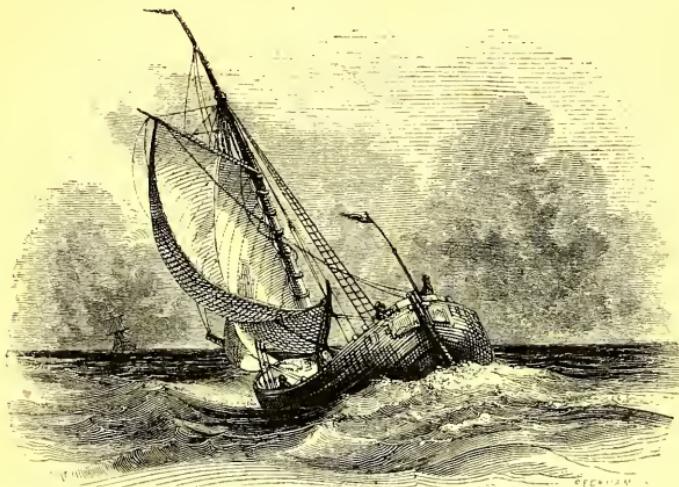
Amboy is not directly across the North River from New York, but is further to the east, and at the head of an arm of the sea, which communicates with the North River on the northern side of Staten Island, so that the passage to it would require several hours, even if the wind and weather had proved favorable. The wind and weather were, however, not favorable. The prospect was fair when they sailed, but, not long after they left New York, there came up a squall which blew them out of their course.

The vessel in the squall.

The boom.

The main-sheet.

Here you see a picture of the vessel just before she was struck by



the squall. The waves are beginning to run high, and dark, stormy-looking clouds are seen hovering over the horizon. The squall ended in a gale, which drove the vessel entirely out of her course, and carried her down the harbor. She pitched and tossed about very violently, and careened to the wind. At one time, in the confusion, one of the passengers, a German, was knocked overboard by the boom. The boom is the round beam of wood which forms the lower edge of the sail. You can see the boom in the picture. The boom must be made strong and heavy, so as to keep the edge of the sail stretched straight, and to resist the force of the wind. It is usually secured in its place, when the boat or vessel is sailing along quietly, by means of a double rope and

Danger from the boom.

The German falls overboard.

pulley. This rope is called the sheet. You can see the sheet of this sail in the picture. It is fastened to the boom, near the middle of it, and the ends are carried to the stern of the boat, near where the helmsman sits. The sheet of the main-sail of a boat or vessel is called the main-sheet.

Some persons, when they hear the *sheet* spoken of, in nautical language, imagine that it must mean the sail itself, or the cloth that the sail is made of. But it does not. It means the ropes by which the lower edge of the sail is controlled, and drawn in or out, according to the state of the wind. There are a great many commands that you hear on board a vessel or a sail-boat, relating to the sheet, such as, "*Let go the main-sheet!*" "*Haul in the main-sheet!*" and "*Ease away the main-sheet!*"

The sheet generally confines the boom and keeps it steady, but sometimes, in a gale of wind or in a sudden squall, the sail above, and consequently the boom below, thrash about dreadfully, and those who are near it have to dodge down into the bottom of the boat to keep out of the way of it, or else they get knocked overboard. It was in this way the German got knocked overboard in this voyage. Very fortunately for him, however, Franklin happened to be very near him at the time, and, leaning over the gunwale, he seized the poor man by the hair of his head, which was very thick and shaggy, and so pulled him up toward the boat again, and then, by the help of some of the seamen who rushed to his aid, and in some measure through the efforts of the drowning man himself, who came up the side clinging convulsively to every thing that he could get hold of, and climbing at intervals with desperate struggles, they brought him on board.

Danger from the boom.

Franklin in great peril.

The breakers.

The man was intoxicated when the accident happened. This was the reason, probably, that he failed to get out of the way of the boom. The fright, however, and the cold bath sobered him very suddenly.

Always look out well for the boom when you go sailing in a boat. It is a mischievous thing. Even when it can not hope to knock the man himself overboard, it seems sometimes to take great delight in taking his hat off.

But to return to our story. The boat that Franklin was in was driven entirely out of her course, and was finally carried across the harbor of New York, and driven toward the shore of Long Island, which shore lay in a direction exactly opposite to where they wished to go. The sails, too, were torn to pieces by the wind. When the boat approached the shore, there was a tremendous surf rolling in upon the beach, and the men were afraid that, if they attempted to land, they would be overwhelmed. So, before their boat got near enough to be in the breakers, they cast anchor. As soon as the anchor took hold of the sand on the bottom, it brought the boat up, as they say, though she swung round toward the shore as near as the length of the cable which they had payed out would allow.* Then the men saw that between them and the shore there was a broad belt of roaring surges, tossing tumultuously, and rolling in with terrific fury upon the beach, and ready to dash the boat to pieces, and devour all on board, if the anchor or the cable should give way.

Some men came down to the shore, from the houses on the land, to look at them. The men in the boat made speaking-trumpets

* To *pay out* is the phrase seamen use for *let out*.

The men call for help.

Surf-boats.

Wreckers.

of their hands, and shouted out as loud as they could vociferate, calling for help. The men on the shore called out something to them, in the same way, in reply. Neither party, however, could hear a word that was spoken by the other.

The men in the vessel, in looking about for some means of deliverance, saw several small boats on the shore, drawn up high on the sand, where they would be out of the way of the waves. They were a kind of boats called surf-boats. They are made expressly to go through the surf in. The men who live on such shores have occasion to go out and to come in very often, in going a fishing or returning home, and they acquire great dexterity in going through the surf. They can usually go through it quite safely, unless it is *too* high.



Here is a picture of a surf-boat, with some men going through the surf in it, on a rocky and dangerous shore.

“I wish,” said one of the seamen on board of the vessel, “that they would come off in one of those boats, and take us to the land.”

“Yes,” said another, “if we could only make them hear.”

So they called out again, as loud as they could possibly call, and

The men make signs.

Wet and uncomfortable night on board.

then listened for a reply. The men on the beach seemed to be trying to answer, but the seamen could not hear a word that they said.

"Let us make signs," said one of the seamen.

So, standing up on the highest point of the vessel that he could get to, he pointed to the small boats, and beckoned, and made other gesticulations, to denote that he wished the men to come off in the small boats and take them ashore. This pantomime, however, was as unavailing as the words had been. The men did not move toward the small boats, but, after standing a little longer on the beach, talking with each other, they went away, and were seen no more.

So the people on board the vessel had nothing to do but to wait where they were until the wind should go down. In the mean time, night was coming on, and they began to be cold and uncomfortable. There was no place to go to for sleep, or even for shelter, except a sort of cuddy which was formed in the bows of the boat, under a small deck which was made there, called the forecastle. This place was hardly large enough to hold them all, but still they all crowded into it. The German was there already, lying in his wet clothes, and, besides this, the waves dashed over the bows of the vessel, and the water leaked down through upon them all night, making them very wet and thoroughly wretched.

Morning came at last, however, and when the men issued forth from their wretched cabin, they were rejoiced to find that the storm was so far abated that they could proceed on their voyage. So they mended up their sails, hoisted the anchor, and set forth again. In the course of the day they reached Amboy safely.

Franklin gets sick.

His remedy.

Journey across New Jersey.

When they landed, they had been thirty hours in their vessel without any thing to eat or drink, except that there was a bottle of wretched rum on board—a drink which Franklin abhorred. There is a very good story to tell about Franklin's dislike of all such drinks as rum, which will come by-and-by.

Franklin was made quite sick by the hardship and exposure which he had suffered, and he went to bed that night in a high fever. He took no remedy, however, except to drink very copious draughts of cold water, which he had heard was good in such cases. In the morning he was much better, and so he set out to continue his journey on foot across the State of New Jersey. The distance across to the Delaware River, at Burlington, was about fifty miles; too far, of course, for him to go in one day, though now we go by the rail-road in less than two hours. Franklin, however, set out with pretty good courage; but he had not gone far before the storm came on again, and he was compelled to hasten on very vigorously to get out of the way of the rain, as shown in the engraving at the commencement of this chapter. At last he came to an inn, and was obliged to stop for the night. It was a poor, miserable place, and Franklin being wet, muddy, and wretched, made such a figure, that he found the people were suspicious of him, and looked upon him with a sort of contempt, as they would upon some strolling beggar. As the people saw that he was quite young, they questioned him, asking him who he was, and where he was going; and as he could only answer these questions in an evasive manner, they suspected that he was some unmanageable apprentice running away from his master—which, very unfortunately, was pretty near the truth.

He arrives at Burlington.

The gingerbread woman.

Boat gone

In a word, the poor boy found himself in a very forlorn and wretched condition. He went to bed feeling very unhappy, and wishing sincerely that he had never left home.

The principal ingredient in his cup of bitterness at this time was, undoubtedly, the self-reproach which he must have endured to think of the anguish that his father and mother were suffering in being thus forsaken by their erring son.

CHAPTER VII.

DOWN THE DELAWARE RIVER.

FRANKLIN met with various other adventures and difficulties on his way through New Jersey, but at length, to his great joy, on Saturday, the third day after he left Amboy, he reached the shores of the Delaware River. The place where he reached the river was Burlington, then a small village, but now a very large town.

Franklin was very tired and hungry when he reached Burlington. He stopped in the street, and bought some gingerbread of a woman who kept gingerbread and cakes to sell at a stand, and then he went on down to the water, to see if he could find a vessel going to Philadelphia.

Burlington is on the Delaware River, not far from twenty miles above Philadelphia. Franklin was so tired with the journey which he had already taken, that he was extremely unwilling to walk this additional distance, and so he went to the bank of the river to see if there was not a boat going down. They told him that the regular boat had *just gone*.

No boat for three days.

Kindness of the poor to each other.

He was very much disappointed and chagrined at this intelligence.

"Dear me!" said he, "how unlucky! When will there be another boat?"

"Not till next Tuesday," said the men whom he was questioning.

Franklin turned away in a very sorrowful state of mind, and walked slowly and despondingly up into the street.

He presently came to the stand where the gingerbread woman was, and he stopped to ask her what she thought he had better do. She said that he might come to her house, and lodge there until another boat should go. This was a generous offer for such a woman to make; but then Franklin was so young, and he looked so tired and so forlorn, that she took pity on him. It is not at all impossible that she may have had a son herself who was wandering about the world somewhere, and Franklin may have reminded her of him. A mother who has children far away, that she knows stand in need of kindness where they are, takes great comfort in showing kindness to any others that she sees suffering near her. Besides, persons in humble life are often more kind to those who are in trouble and distress, and take much greater interest in endeavoring to relieve them, than the wealthy and the powerful. Prosperity tends often to make us selfish and cold-hearted, and the more we have laid up, the stronger are our desires to save all that we can to add to the store. Thousands of Irish servant-girls in New York send a large part of their earnings to their parents, and brothers and sisters, at home, but the rich people in New York generally leave their poor relatives to take care of themselves.

Franklin eating his dinner.

He takes a walk to the river.

Franklin went to the woman's house, and the first thing that she did was to give him a good dinner. Here he is eating his



dinner. The woman herself is standing by. She is going out to buy a mug of beer. Franklin looks wan and weary, yet pleased now to get something good to eat. His stick and bundle are lying on the table by his side.

After finishing his dinner, Franklin went out to take a walk, and, as boys always do in such cases, he at once turned his steps toward the banks of the river. After walking about there some time, amusing himself by looking at the boats and vessels, and at the men climbing about the rigging, or hoisting things in and out, he spied a boat coming down the river. This boat stopped at the landing near where Franklin was, and, on inquiring, he learned

Passage down the river.

Advantage of consulting maps.

that it was going down to Philadelphia. Franklin was overjoyed to hear this, so he made a bargain with the men on board to let him go with them. He went immediately back to the house to get his bundle and stick, and to bid the kind gingerbread woman good-by. Then he came back to the boat, and very soon they set sail.

That is, they attempted to set sail ; but there was no wind, and the sails were useless. So they concluded to row. They got out the oars, and as there was quite a number of persons in the boat, they divided the company into sets, with a view of taking turns in the rowing. The first set then took the oars, and the boat began to move slowly down the river.

If you have not yet referred to a map, to follow Franklin's route upon it, I advise you by all means to do it now, before you go any further—that is, provided there is a map that you can have access to while you are reading this story. It will make the story far more interesting to you to find Boston, where Franklin started from, and thence trace his course round Cape Cod, and through Long Island Sound to New York. You can also see the North River flowing south of New York, and find the place where Franklin attempted to cross it to go to New Jersey, and the harbor below, across which his boat was driven, and the end of Long Island, where the party came so near getting wrecked, and where they spent that night in so wet and uncomfortable a manner. Then you can find Amboy, and the track across New Jersey from Amboy to Burlington, and then the course of the river from Burlington to Philadelphia. Thus you can follow Franklin, step by step, the whole of the journey. This will not only make the story itself

Perplexity.Philadelphia seen at night at the present day.

more interesting to you, but will give you correct geographical ideas of the whole region, or renew and reimpress upon your mind your knowledge of it, if you had studied it before. The reason why you study geography and maps at school is, that you may have some general knowledge of such localities, and know where to look for the places referred to when you read such narratives as this. All gentlemen and scholars who have libraries think it very essential to have atlases and maps in their collections, and whenever they read about places, or about the routes of travelers, they look them out, so as to see precisely where the places that are mentioned are. Sensible boys and girls do the same, using the best maps they have at command for this purpose.

But to return to the boat. The men rowed, each in his turn, till about half past eleven o'clock, and then they began to wonder why they did not come to Philadelphia. They rowed on for half an hour longer, and then some of them began to think that they must have passed the town. It was in the night, though not very dark, and so they thought it possible that they might have gone by the town without seeing it. Such an idea, at the present day, would be quite absurd, for the river opposite the city is lined for miles with ships, and steamers, and barges, all displaying lanterns in the rigging, and the water is covered with ferry-boats going to and fro, brilliantly lighted, while the whole city, extending a great way up and down the river, and back into the land farther than you can see, blazes with countless thousands of stars, formed by the lighted windows of the houses, and the long rows of gas-lights in the streets. In fact, Philadelphia, seen from the water at midnight, presents a most magnificent spectacle.

Philadelphia at night in Franklin's time.

But it was very different from this in Franklin's time. There might then have been a few small vessels lying in under the shore, but they would have had no signals. The streets were not lighted. People carried lanterns when they went about after dark. And as for lights in the windows, every body there went to bed at ten o'clock, so that the only chance of seeing the illumination of a fire or a candle within a house was that some one might be sick, and a lamp or candle might be left burning for the watchers.

The men in the boat had a great dispute on the question whether they could have passed by Philadelphia or not. Some said they must have passed it. Others said it was impossible. Finally, they concluded that, at any rate, they would not go any further; so they turned the boat's head toward the shore, and, finding a little creek, they ran the boat up into it, and landed.

The night was quite cool, and so our travelers concluded that they would build a fire. In fact, they needed a fire for company as well as for warmth. A fire, when persons are encamped in a solitary place at night, has a very cheering and animating influence; so much so, that if a boy were to get lost, and have to stay in the woods all night, and could have his choice either to have another boy with him for company, and stay in the dark, or to have a fire for company, and stay alone, I think he would find himself somewhat puzzled to know which to choose.

Which should you choose?

Fortunately, Franklin's party were not placed in any such dilemma.* They had plenty of company, and they had also the

* A dilemma is a case in which a person is shut up to a choice between two things, both, perhaps, disagreeable or difficult.

Encampment of the party on the bank of the river.

means for making a fire. They found, near the place where they landed, the ruins of an old fence. They took some of the rails for wood, and to get fire I suppose they had a tinder-box, for phosphoric matches had not been invented in those days. By this means they built a good fire, and, after warming themselves well, they lay down to sleep around it, and remained there till morning.

In the morning, the men who belonged to the boat knew at once where they were. They had not gone beyond Philadelphia, though they had got almost to it. As soon as they had thus found out their position, they got into the boat again, and rowed on till they reached the city. The place where they landed was at the Market Street wharf or pier. It is important to state this fact, as this book may be read by many boys and girls who live in Philadelphia, some of whom may like to go down to the foot of Market Street, when they are taking a walk in that vicinity, and see exactly where young Franklin landed when he first came to their city.

Whether they can find the creek where the boat landed in the night, I do not know. Franklin says it was called Cooper's Creek, and that it was only a little way above the town.

When the boat landed, Franklin found that he had in his pocket one dollar, and also a parcel of pennies, amounting to about a shilling. This was all the money he had. He offered the boatmen the pennies to pay for his passage down the river. At first they refused to take this money, saying he had rowed so much coming down that he had fully earned his passage, but Franklin insisted upon it. He felt very independent, although he had only a dollar left. In fact, those young men who are conscious of possessing

Franklin in the streets of Philadelphia.

Visit to the baker's.

strength and skill to earn their living with their own hands, are generally more independent in feeling than any body else.

CHAPTER VIII.

SUNDAY IN PHILADELPHIA.

IT was nine or ten o'clock on Sunday morning when Franklin landed in Philadelphia, and here is an engraving representing the

singular appearance that he made in the streets, an hour afterward. He walked up from the landing toward Market Street, tired with the hard rowing which he had done during the night, and very hungry, and not knowing where to go to buy any thing to eat; for of course, as it was Sunday, the shops were all shut. While walking thus, he met a boy eating a piece of bread. He asked the boy where he got that bread. "At the baker's," said the boy. "Where is the baker's?" asked Franklin. So the boy told him where

the baker's was, and Franklin proceeded to the place.

He went in, and, seeing the baker, he told him that he wished to buy some biscuits. The baker said they did not bake biscuits.

Biscuits were a very well known and common kind of baking in Boston, but it seems that it was not customary to make them in Philadelphia.



The threepenny loaves.

Miss Deborah.

Franklin's forlorn appearance.

"Then give me a threepenny loaf of bread," said Franklin.

The threepenny loaf was also, as it proved, a Boston notion. The baker said he had not that kind.

"Well, then, give me something or other," said Franklin—"threepenny worth of bread, in any form you please."

So the baker gave him three rolls, each being worth a penny. The rolls were made of a kind of bread that was raised very light, and, though only a penny apiece in price, they were very large. The three rolls made more than Franklin wanted, though he was very hungry; still, as he had called for threepenny worth, he thought he would take them all. He tried to put one or two of them in his pockets, but his pockets were full, and there was no room. So he had to carry them the best way he could. He accordingly took one under each arm, and with the other—the one he was eating—in his hand, he walked along the street, eating as he went. The engraving on the opposite page is a picture of him.

While he was going along the street in this fashion, a girl, named Deborah Read, happened to be looking out at the window of her father's house, and when she saw this boy coming by, with his mouth full of the bread that he was eating, and two rolls more under his arms, she could not help laughing at the absurd figure that he made. He looked worse than he otherwise would have done, from the fact that his clothes were poor, and were soiled and defaced from the wear and tear of his long and wearisome journey. All his good clothes were in his trunk, which he had sent round from New York by water, because there was no way by which he could bring his trunk with him across the land. It is not wonder-

Franklin goes down to the river to get a drink.

ful that, under these circumstances, Deborah Read saw something ridiculous in the figure that he made.

It is a little curious and remarkable that this very Deborah Read afterward became Franklin's wife. This circumstance, however, though curious and remarkable—that is, worthy of notice—is not at all extraordinary, since nothing is more common, in all ages of the world, and in all states of society, than for girls to begin with laughing at a young man, and to end with marrying him. In fact, I have heard it said that girls sometimes pretend to laugh at a young man of their acquaintance as a ruse or artifice to aid them in concealing the interest they feel in him. If this be so—and I have no means of knowing whether it be or not—boys should never resent too strongly or take too seriously any jesting words which they may have heard that young ladies of their acquaintance have spoken concerning them.

Franklin found, after he had eaten one of his rolls, that he had had enough, and at first he did not know what he should do with the other two. He began to wish for a drink, however, and so he turned his steps toward the landing again, at the Market Street wharf, in order to get some water from the river. When he reached the wharf, he saw a woman and her son, who had just come down the Delaware, and who seemed to be poor, and so he gave the bread to them. The boy seems, in the engraving, to be very glad to get the bread.

The woman is seated on a raised part of the deck. It is very common to have the part of the deck which is toward the stern raised somewhat above the rest, in order to get a proper height for a cabin below, and also to give the captain and the helmsman, who

The poor woman and her son.

Franklin's present.



Description of the engraving.

The word Quaker.

A good rule.

usually stand on that part of the deck, a commanding position, so that they can see well.

The woman's feet are upon one of the hatches—that is, one of the places where there is an opening leading down into the hold. The cargo of a vessel is put down through the hatches, and, when the cargo is in, the hatches are closed by strong covers made of plank, which go over them. To cover the hatches securely in this way is very necessary, otherwise the rain, and the spray which sometimes dashes over upon the decks of the ship, would go down the hatchway into the hold, and spoil the goods. Besides, the seamen and passengers walking about would be likely to fall down into these openings if they were left uncovered.

After this, Franklin went up into the town again. It was now time for people to go to meeting, and as Franklin saw several persons neatly dressed walking along the street, he thought he would follow them. Under their guidance he was led into a large meeting-house belonging to the Friends.* Now the meetings of the Friends are in many respects different from those of other Christians. Sometimes the congregation sit in silence the whole time,

* The Friends are sometimes called Quakers, but it is generally better to call them Friends, that being the name by which they designate themselves. The name Quaker was originally given to them in derision. It is a good principle, both for boys and men to adopt, that every person and every class of persons should be allowed to choose their own names, and then that the rest of the world should call them by those names, and by no others. While you are boys, never call your playmates by names that you think they do not like. When you become men, never give opprobrious names to the parties in politics, or the denominations in religion, that are opposed to you. Contend with them if you please, but do it in a manly and honorable way. To attempt to create a prejudice against any kind of opinion by giving those who adopt it opprobrious names, is not manly or honorable.

Religious usages of the Friends.Reasons for them.

engaged—many of them, doubtless—in meditation and mental prayer. They have no minister to spend his time during the week in preparing sermons to preach to them on the Sabbath. The older and more venerable members of the society speak whenever it is impressed upon their minds that they ought to do so, and they think it is better that the audience should sit still, and be left to their own thoughts, rather than that any one should attempt to speak to them, unless there is an impression upon his mind from the Holy Spirit of something that he ought to say to them.

Another thing: the Friends wear their hats in meeting, except in time of prayer. They rise and take off their hats as an act of homage to Almighty God in time of prayer; but, as they consider the taking off of the hat an act of homage, they do not think it is proper to do it merely out of respect to man.

To those who have not been accustomed to attend the meetings of the Friends, the sight of the whole congregation, divided as they are—the men occupying one half of the house, and the women the other—and all the men having their hats upon their heads while listening to the preaching, seems to present a very extraordinary spectacle. When we reflect upon it, however, we see there is really no reason why men should be uncovered in the house of God any more than women, and women wear their bonnets in church among all denominations of Christians.

Franklin took off his hat, however, when he went into the meeting, as he had always been accustomed to do in entering the house of God, and, after taking his seat, he waited a long time for the meeting to begin. But it so happened that day that there was nothing said, and so the congregation sat still in silent meditation,

Franklin falls asleep in meeting.

He is waked up.

until at last Franklin, having been awake almost all the night before with rowing in the boat, and hearing nothing said, began to feel drowsy; so he leaned his head against a pillar, and shut his eyes, and here you see him fast asleep.



Franklin continued asleep till the end of the meeting, and even then, the noise that the people made in going out did not wake him. Some one of the people, however, seeing that he was asleep, went to him and aroused him, doing it in a kind and gentle manner. The Friends are celebrated all the world over for their benevolence and humanity. It is no matter

whether the trouble that a man is in be great or small, they always seem to take pleasure in doing all in their power to relieve it. Some persons, in seeing a young man asleep in such a case, would have gone out, pointing at him and laughing at him.

Franklin rose from his seat somewhat confused, and went out. He was now in the street again, and he did not know where to go.

Franklin's lonely condition.

His trade.

An advantage that he enjoyed.

He was houseless and homeless, and he had, moreover, very little money in his pocket. He, however, was not disheartened or dispirited, for although he was in a strange city, and had no money—or, rather, scarcely any—he had a good trade, by which he knew that he could earn his living. Having a trade by which a man can earn five hundred dollars a year, is about equivalent to having a fortune of ten thousand dollars in a bank ; for ten thousand dollars will only produce, on interest, about five hundred dollars a year. It is true a man with a trade may become sick, and not be able to work at his trade ; and so, on the other hand, in respect to a man with a fortune, the bank where his property is invested may fail or be robbed, and so he may lose all his money. One of these dangers is probably about a fair offset to the other ; so that a man in a strange city, with no money and a good trade, is on a level, in respect to independence, with a man who should have ten thousand dollars in money and no trade.

There was another great advantage that Franklin enjoyed at this period of his life, from which young men at the present day in large cities are often debarred. He was entirely at liberty to do just as he thought fit himself, without any regard to what would be considered genteel. A young man beginning the world now, feels very often compelled to spend money for things that he cares very little about himself, in order that he may make a genteel appearance in the eyes of his acquaintances. This keeps him back a great deal, sometimes, in his efforts to lay the foundation of his future fortune. It is a very fine thing to be genteel, no doubt, and even fashionable, and there is a great pleasure in it when one's fortune is made ; but it is somewhat inconvenient to

Franklin determines to look for a lodging.

say the least, for a young man, struggling to get well begun in the world, to be compelled, out of regard to the opinions of others, to expend, in mere outward *show* and *display*, the money which he might use most profitably in his business as an element of *power* to carry him forward to fortune.

Franklin had none of these restrictions. He was not obliged to go to some elegant hotel, where he would have to expend all his money in a single night for a genteel lodging. He could buy bread and eat it in the streets, if he could make his money go farther by so doing. He did not care if some of the young ladies did laugh. The very ones that laughed would be the most glad, very likely, to have him choose any of them for a wife, when he should have attained the prosperity which this prudence and frugality led to.

Franklin, after he came out of meeting, walked along the street, looking out for some inn where he could go and have a lodging for the night. His plan was to go the next morning to see Mr. Bradford, the printer, to whom he had been recommended by his father at New York. He could not go there that day, because it was Sunday, and so, as he was now tired of walking about the streets, he concluded to look up his lodgings for the night.

He thought he would inquire of some one in the street for a suitable place. He did not think it safe to go to any tavern that he should chance to see, for fear that it might be a bad place, where he would get among drunkards and thieves; so he concluded that it was best to inquire. But then the question was, whom should he inquire of? He knew not a single person in all Philadelphia. Finally, he thought that he would walk along the

He meets a Friend in the street, and inquires of him.

street until he met some person who looked kind-hearted and honest, and ask him.

He had not walked far, after coming to this resolution, before he met a young Friend coming toward him, whose countenance, as he says, pleased him, and he accordingly stopped him, and asked him if he would be kind enough to tell him where was a good place for a stranger to get a lodging.

"Yes," said the Friend, "I will tell thee. There is indeed a house close by here where they receive strangers, but it is not a reputable one."

So saying, the Friend pointed to a tavern by the side of the street, near where they were standing. It had a sign of three sailors painted over the door, and the name of the tavern was the Three Mariners.

"I would not advise thee to go to that house," said the Friend, "but if thou wilt come with me, I will show thee another which is better."

Franklin thankfully accepted this invitation, and the Friend conducted him to another tavern which was called the Crooked Billet. It was situated in Water Street. Franklin went in and engaged a room. Before he went to his room, however, he called for some dinner. The landlord eyed him very suspiciously all this time, suspecting that he must be some runaway apprentice. Being so young, and looking so soiled and wayworn, and having, moreover, only one small bundle of clothes for baggage, it is not surprising that he was taken for a runaway. The landlord gave him some dinner—asking him several questions while he was eating, in order to find out, if possible, who he was—and then, after he

Franklin goes to bed.

The next morning he proceeds to Mr. Keimer's.

had finished his dinner, showed him to his room. The poor boy was glad enough to see a bed. He did not even stop to take off his clothes, but threw himself down on the outside of the bed, just as he was, and was very soon fast asleep.

The first thing that he was conscious of after this was a knocking at the door. They had come to call him to supper. Franklin got up and found that it was six o'clock. He had slept all the afternoon. He was still almost too sleepy to go to supper ; however, he went down ; but he came back again as soon nearly as he finished eating, and undressed himself and got into bed. He was soon fast asleep again, and he slept very soundly until the next morning.

CHAPTER IX.

MR. KEIMER'S PRINTING-OFFICE.

FRANKLIN rose the next morning, and found himself greatly refreshed. He brushed his clothes, and made himself look as neat as he could with such means as he had at command, for his trunk had not yet come, and after breakfast he set out to go to the printer's, to see if he could get employment.

It seems that at this time there were two printing establishments in Philadelphia, while there was not much more business than was desirable for one. The two printers, therefore, were rivals in some sense, and yet they were ostensibly on friendly terms with each other. Their names were Bradford and Keimer. Mr. Bradford was a young man, the son of the Mr. Bradford of New York, whom

Franklin's interview with Mr. Bradford at his printing-office.

Franklin had called upon there, and who recommended to him, as you recollect, to come to Philadelphia and apply to his son. Mr. Keimer was a young man who had just commenced business in the town.

Now it so happened that old Mr. Bradford, of New York, who had recommended to Franklin to proceed to Philadelphia, was about going to Philadelphia himself at that time, to visit his son, and he set out on the journey a short time after Franklin did. Mr. Bradford traveled across New Jersey on horseback, and as Franklin came on foot, and was detained, moreover, by the storms and other mishaps that he encountered, Mr. Bradford arrived in Philadelphia before him; so that, when he went to young Mr. Bradford's office, he found the old gentleman himself there.

Mr. Bradford the younger, after hearing what Franklin had to say, replied that he was not in want of any more workmen than he had already.

"But," said he, "there is another printer in the town, who has lately set up, and he may like to employ you. His name is Keimer."

Franklin asked where Mr. Keimer's printing-office was, and after giving him the necessary direction, Mr. Bradford added,

"If Mr. Keimer does not wish to employ you, you may come back here, and I will give you something or other to do—enough, at least, to pay your board and lodging—until you can get a situation."

Both these offers evinced a noble and generous spirit on the part of Mr. Bradford. Many men in his situation would not have recommended to Franklin to go to Mr. Keimer. They would have

The advantages of a generous treatment of rivals.

considered this as only helping a rival, and so injuring themselves. But I do not think there is much lost in helping others on, even where they are going the same road with ourselves, so that there is danger of their being somewhat in our way. Besides, even if the result of such kindness to others should be to prevent our going along quite so fast ourselves, there is much satisfaction and comfort in being useful to our fellow-creatures, and in being on friendly terms with them, that we shall spend our lives more happily, even if we do not get rich quite so fast, by acting on this principle.

Suppose you were going up a mountain alone, and you were to see a stranger boy, younger than yourself, coming on behind you, would you not rather wait a little for him, and help him along, and have his company and friendship all the way, even suppose that you should not get to the top quite so soon? or would you rather hasten on and leave him behind, and, perhaps, roll stones down upon him from above to hinder and trouble him? That is the way some men do in respect to those who are in the same business with themselves.

Old Mr. Bradford was as friendly in disposition as his son had been, and he offered to go with Franklin to Mr. Keimer's office. So they went together. When they entered the office, Mr. Bradford told Mr. Keimer that he had brought a young man who was acquainted with the printing business, and who was in search of employment, and he asked Mr. Keimer if he would like to employ him. Mr. Keimer turned to Franklin, and asked him what his name was, and how old he was, and where he came from, and some other similar questions, and then gave him a composing-

Franklin is put to trial.

Result of the trial.

stick, and requested him to go to a case, and set type a little, so that Mr. Keimer might see how he could work.

You will recollect, perhaps, that in describing the process of printing, some chapters back, I told you that the types were put in the several compartments of a broad box called a case, and that the printer took them from these compartments in their proper order to spell the words which he wished to print, and then stood them up in that order in a little iron box or frame, which he held in his hand for the purpose. This box or frame, which is a very curious thing, is called a *composing-stick*, although it is not at all like a stick in any respect. It was one of these composing-sticks that Mr. Keimer wished Franklin to take, in order to set types in it by way of showing what he could do. Now Franklin could set types exceedingly fast and well, and Mr. Keimer was quite satisfied with the result of the experiment; so he told him at once that he would employ him very soon.

Mr. Keimer then turned to Mr. Bradford, and began talking about his plans and prospects in respect to getting business in Philadelphia as a printer. He had no idea that Mr. Bradford was the father of the other printer. He had never seen him before, and by his coming in as he did, bringing young Franklin to offer him as a workman, Mr. Keimer supposed that he was some respectable citizen of the town, who took an interest in his coming there, and was disposed to help him by every means in his power; so Mr. Keimer began to talk to him quite freely about all his plans for getting the business away from the other printer.

As soon as Mr. Bradford heard Keimer speaking in this way,

Conversation between Bradford and Keimer.

he concluded that, instead of telling him at once who he was, that Keimer might not go on thus and betray himself to the father of his rival by making known all his secret plans and designs, he would listen and hear all that Keimer was willing to say. He even drew him out more and more by asking questions, all of which Keimer answered very confidently, not in the least suspecting who the stranger was.

Here you see a picture of the men engaged in the conversation.



Which is Mr. Keimer ?

And which is Mr. Bradford ?

And which is young Franklin ?

The artist, in making the drawing, has very properly put Franklin in the background, because he merely stood by as a listener—

Remarks on the engraving.

The press in the background.

Mr. Keimer and Mr. Bradford being the principal actors in this scene. See how earnest Mr. Keimer is in explaining his intentions and plans to Mr. Bradford. Observe, also, how striking and full of meaning is the expression of Mr. Bradford's face. He seems to say to himself, "Indeed! So that is your plan, is it?" See also how adroitly the artist has given such an expression to Franklin's face as corresponds with the situation he is placed in. You can only see a part of his face, but how plainly that part tells you that he is listening to all that is said—that he understands it all, and is almost disposed to laugh, but is endeavoring all the time to look grave and indifferent. It requires great skill in the designer to give so much expression to a face by so few touches of his pencil.

At last the conversation was ended, and Mr. Bradford went away.

Mr. Keimer then asked Franklin who that gentleman was that came with him. Franklin said that it was Mr. Bradford, of New York, the father of Mr. Bradford, the printer, of Philadelphia.

Mr. Keimer was very much astonished to hear this, of course, and he wished that he had not been so indiscreet as to talk as he had done about his private affairs to an entire stranger.

The big frame that you see drawn faintly in the background of the picture is the *press*, where the sheets of paper, after they are printed, are pressed smooth again. It is not the press for doing the printing itself. In fact, every sheet of paper, in passing through the printing-office, has to be pressed twice—once to print the letters and words upon it, and a second time to make the sheet smooth again, because, in printing the letters and words upon it,

The balls for putting on ink.

Nature of printer's ink.

the paper becomes indented, and it must be made smooth again by putting it into another press, between sheets of smooth paste-board—a great many in a pile—and then screwed very tight. They sometimes leave the paper in the press all night, and then, in the morning, when they take it out, they find that it is perfectly smooth.

The press for this purpose has to be made very strong and massive. The frame of it is formed of timbers, as you see in the engraving.

By the side of the press, on a shelf, you see a sort of ball with a handle. This is what they were accustomed to use in former times to ink the face of the type with, when they were ready to print from them. They used two of these balls, the workman holding one in one hand and the other in the other. You can see a picture of them both in the engraving ten or fifteen pages further on. These balls were made soft, and covered with leather. The ink was taken up by them from a smooth board, which was fastened like a sort of shelf at a convenient place near the press, and on which a portion of ink had been previously placed. The ink used in printing, I must add, is not *fluid*, like writing ink. It is very thick and tenacious, like tar.

The workman, after taking up some of the ink from the shelf by means of his balls, would work the balls together until the ink was equally distributed all over the flat surface of the leather, and then he would apply it to the types. These balls have, however, now gone out of use. The printers now use rollers instead, which are much easier to work, and much better in every respect.

Great publishing operations in Philadelphia at the present day.

CHAPTER X.

FRANKLIN GOES TO WORK.

PHILADELPHIA is, at the present day, one of the greatest publishing cities in the world. It contains a large number of immense printing-offices, with thousands of workmen incessantly employed in setting types and making up pages and forms, and long rooms full of girls sitting at tables folding and stitching books, and great power-presses, driven by steam, thundering incessantly at their work, and printing millions and millions of sheets every week. In Franklin's day, how different it was ! All the monstrous establishments of the present day were then represented by the two offices of Bradford and Keimer, and at Keimer's there was only one case, and Franklin could not be employed immediately when he applied, because Mr. Keimer himself was using that case, and so there was nothing that he could do !

It is true, there was a press for printing off the work when the types were set, but this could not be used, because there were no types ready. Mr. Keimer was then setting them. As soon as he should get them all set up and ready, Franklin might print the sheets at the press, while Mr. Keimer was setting up the types for something else ; but at present there was nothing for him to do.

Besides, the press was out of order. Mr. Keimer himself did not know how to put it in order, nor, in fact, did he know much about using it. It seems that there are two separate branches to the printing art, the setting up of the types, which is called *com-*

Franklin is engaged by Mr. Keimer.

Various arrangements.

position, and the printing of the sheets, which is called *press-work*. Mr. Keimer only understood composition.

He took Franklin to his press to show it to him. Franklin, whose custom it had been to take pains to learn every thing that he could, understood about presses and press-work as well as about composition. On examining the press, therefore, he saw what the difficulty was, and he knew how to remedy it. So he went to work, and put the press in order. He then made an arrangement with Mr. Keimer, that as soon as the work which Mr. Keimer was composing was ready, he should come and print it, and that, in the mean time, he would go back and work for Mr. Bradford, to pay for his board and lodging there, until Mr. Keimer should be ready.

It is a curious circumstance that the work which Mr. Keimer was printing was a work of his own, as he was an author as well as a printer. Only he did not first write the work, and then set it up afterward, but he put up his sentences in type as fast as he made them, without any copy. This was the more remarkable, as the work was in poetry. It was an elegy on a man who had died in Philadelphia a short time before, and who had been so much respected and beloved by the people of the town as to lead Mr. Keimer to suppose that they would be interested in reading his elegy. His plan was, when it was printed, to sell it about the town, and so make money.

The arrangement above described having been made, and the press having been got ready, Franklin went back to Mr. Bradford, who gave him some work to do, and let him have board and lodging at his house until Mr. Keimer should call for him. In a few days Mr. Keimer sent for him. In fact, he was so much pleased

Franklin goes to board at Mr. Read's.

Miss Deborah.

with the talent and capacity which his new workman manifested, that he did not wait for the elegy to be ready. He happened to have at that time an offer of a new job, the printing of a pamphlet, so he got a new pair of cases made, and then sent for Franklin to come and set up the pamphlet.

There was still a question about board and lodging, for Mr. Keimer did not keep house; so, for a time, Franklin continued to board at Mr. Bradford's. Mr. Keimer did not like this very well. It did not seem to him suitable that one of his workmen should board at the house of his competitor and rival, so he proposed to Franklin that he should board at some other place. Franklin asked him where it should be. He replied that he knew a Mr. Read's where he could board.

It happened curiously enough that this Mr. Read's was the very place where the young girl lived who laughed at Franklin's grotesque appearance when he was walking through the street, with his rolls of bread under his arms and his mouth full, on the first day after he arrived in Philadelphia.

Franklin made no objection to the arrangement proposed by Mr. Keimer, and so he removed to Mr. Read's. His trunk of clothes, too, from New York, which he had sent round by water, arrived about this time, and he could now dress himself quite neatly, so that, as he says himself in narrating these transactions, he made a much more respectable appearance in the eyes of Miss Deborah now, than he did the first day she saw him.

Thus the wanderer was at last very comfortably and happily settled. His master, Mr. Keimer, soon began to have a very high respect for him, and to intrust him with more and more

His pleasant situation.His extraordinary talents.

important duties, so that his position and his influence in the office soon became very high. He was happy, too, in his boarding-house. Miss Read he found a very agreeable young lady, and he used to like very much to see and talk with her in the evenings after his work for the day was done.

He began, too, to form some acquaintances among the young men of the town, though he avoided very carefully all those whom he saw idling about the streets, and spending their time in smoking and drinking. He chose for his associates those who were fond of reading and study, and who took an interest in improving their minds in acquiring knowledge.

I think, however, that the fact of Franklin's taking so strong an interest in intellectual pursuits, and other such occupations, was not owing altogether to his good sense and virtuous principle. It was the result, in part at least, of his extraordinary talents and abilities. A young man of dull and feeble powers of mind can not take the same pleasure in acquiring knowledge as the bright and intelligent may be expected to do. His nature being more like that of a mere animal in respect to mental endowments, he must be expected to have a greater taste for play, and for mere animal gratifications, than those who possess higher and nobler powers. When, therefore, we see a young man who dislikes to learn, and prefers to spend his time in idleness or play, it is generally, though not always, a token of mental inferiority. It is the same with a girl who takes no interest in improving her mind, but thinks only of dress, and amusement, and display.

Franklin would have been happy in the situation in which he now found himself placed, were it not for the feelings of uneasi-

He feels self-condemned and unhappy on account of his parents.

ness and self-condemnation which he felt when he thought of his father and mother at home. He knew what bitter anguish they must be enduring in having been thus abandoned by their youngest and dearest son, and of the incessant anxiety which they must suffer in their desire to learn what had become of him. He did, however, all in his power to banish these thoughts from his mind, and to make himself as contented and happy as possible. He kept it a profound secret from all his friends who he was, and where he came from. In fact, only one person in Boston knew where he had gone, and that was Collins, the boy who had helped him plan his flight. Collins kept the secret very faithfully. It was, however, at last discovered, and that in a very singular manner. The circumstances attending this discovery will be related in the next chapter.

CHAPTER XI.

A VISIT FROM THE GOVERNOR.

ONE day, after Franklin had been for some time established in his place in Mr. Keimer's printing-office, as he and Mr. Keimer were at work near the window, they saw the governor of the colony, and another gentleman with him, both elegantly dressed in the costume usually worn by grand officers in those days. Mr. Keimer and Franklin both looked at them, and were presently very much surprised to see that they were coming across the street directly toward Mr. Keimer's house, and immediately afterward they heard them knocking at the door below.

A very unexpected call.

Explanation of the case.

The Governor's name was Sir William Keith. The gentleman who was with him was Colonel French, a gentleman who resided at Newcastle, which is a town on the River Delaware, about forty miles lower down than Philadelphia.

Mr. Keimer was greatly excited when he saw these gentlemen approaching his door. He supposed that the Governor was coming for some reason or other to see *him*, and he ran down stairs at once to receive him.

The Governor, however, as soon as he saw Mr. Keimer, asked if there was a young man in his office named Franklin. Mr. Keimer replied that there was, and that he was then in the office at work. The Governor expressed a desire to see him, and so Mr. Keimer invited both the gentlemen up stairs. When they entered the office, Mr. Keimer introduced Franklin to the Governor, who immediately fell into conversation with him, and expressed great interest in his welfare. He said that he had heard of him at Newcastle, a few days before, where he had been with Colonel French. He said, moreover, that he wished to have some conversation with Franklin, and he invited him to go over to a tavern there was near by, where he and Colonel French were going, and that there they could talk without interruption. So Franklin laid aside his work, and went away with the strangers, leaving Mr. Keimer extremely astonished at the occurrence. He wondered greatly what the visit of such distinguished dignitaries to his young journeyman could possibly mean.

In order to explain to the reader what it meant, I must go back a little. It seems that one of Franklin's sisters was married to a certain Captain Holmes, a shipmaster, who sailed a vessel to and

Captain Holmes.His desire to discover where Franklin had gone.

fro between Boston and the Delaware River. This Captain Holmes knew all about Franklin's running away, and was very desirous of finding out where he was. So, when he got to Newcastle, on the next voyage that he made after Franklin disappeared from Boston, he sent up to Philadelphia to make inquiries whether there was a young man named Franklin in either of the printing-offices there. In answer to his inquiries, he learned that there was. Captain Holmes, having thus learned his brother-in-law's address, wrote a letter to him to try to persuade him to go back to Boston again. He told him in this letter that his father and mother, and all his friends in Boston, were very greatly grieved at his having gone off in so abrupt and stealthy a manner, but that they did not harbor any ill feeling against him on that account ; on the other hand, they desired very earnestly that he should return. Captain Holmes assured him that, if he would return, his friends would forget the past, and that if he would go back to his brother's office, he should have no further cause of complaint there, but that every thing should be arranged to his mind.

When Franklin received this letter, he sat down and wrote a long and full reply to it. He thanked Captain Holmes for the kind interest in him that his letter expressed, but said that he could not on any account consent to go back to Boston. He then made a statement of the whole case, describing the harsh treatment that he had received from his brother, and stating the other reasons which induced him to come away. The letter was written so well, and was expressed in so clear, lucid, and forcible a manner, that it could not fail of giving a very favorable idea of the writer to any one who should read it.

He shows Franklin's letter to the Governor.

In fact, Captain Holmes was very much pleased with the defense which his young brother-in-law thus made.

Now it happened that the governor of the colony, being at Newcastle about that time on a visit at Colonel French's house, and having some business with Captain Holmes, the two men had an interview together, and in the course of their conversation, while talking over various matters, Captain Holmes mentioned to the governor that he had a young relative in Philadelphia, and, to show what a talented young man he was, he produced the letter which Franklin had written, and gave it to the governor to read. The governor was very much pleased with it, and said that the writer of it was certainly a very clear-headed young man.

"He ought to be helped forward and encouraged," said he. "The fact is," added he, "I wish he would set up the printing business for himself in Philadelphia. Both the printers there are wretched workmen, and if this young Franklin would open an office of his own, he would certainly succeed. I should interest myself for him, and I could procure a good deal of business for his office. I could get him a great deal of printing from the government. When I return to Philadelphia, I shall certainly call and see him on the subject."

It was in accordance with this resolution that the Governor and Colonel French, when the Governor returned to Philadelphia, called at Mr. Keimer's office, and asked for Franklin, in the manner already described.

When the Governor came to see Franklin, in the interview which he had with him at the printing-office, the favorable opinion which he had formed of him from the letter was fully confirmed.

The Governor's plan.The difficulty.

So he determined at once to propose the plan to him of setting up for himself. He did not think it discreet to do this in Mr. Keimer's presence, for *he*, of course, would be very unwilling to have another office opened in Philadelphia, and this was the reason why the Governor invited Franklin to go with him over to the public house. As soon, however, as Franklin was alone with him and the Colonel, he proposed the plan.

Franklin was very much surprised at so unexpected a proposition, and although he thought the Governor did him great honor in suggesting it, he said at once that he did not see how he could carry it into effect for the want of the necessary capital. It required, even in those days, considerable money to set up a printing-office. There were types to be bought, and cases, and two presses, one for printing the sheets, and another for pressing them smooth. And then, besides all this, it was necessary to have money enough to buy paper and ink, and to pay the workmen, while any particular job that might be undertaken was in hand, because, of course, the printer could not expect to get the pay for his job until it was done. Franklin knew all this very well; so he told the Governor that he did not see how he could set up a printing-office at present for himself. He had no money—that is, only a little, namely, what he had earned by working for Mr. Keimer, which amounted to only about fifty dollars—and he did not think that his father would be willing to lend him any for such a purpose.

"I think your father, or some of your friends in Boston, will furnish you with the money," said the Governor, in reply. "I will write them a letter about it myself, and you can go to Boston and carry it, and see what they will do."

Franklin decides to visit Boston.

His conduct meanwhile.

Franklin was very ready to adopt this plan; so it was determined that he should go to Boston by the first vessel that went. If he had been going only to New York, it would have been shorter to go across by land; but as he was going to Boston, it would be quicker, cheaper, and better to make the passage by water.

It was now the month of March Franklin had arrived in Philadelphia the autumn before, and he had now been six or seven months in Mr. Keimer's employ. There was no vessel to go to Boston until April, and so Franklin, instead of being made giddy, as some young men would have been with the dazzling prospects before him, and with the attentions of the Governor, went quietly on with his work in Mr. Keimer's office, just as usual. He, however, gave notice to Mr. Keimer that he intended going to Boston by the next vessel that sailed, though he did not tell him what the business was which chiefly led him to go. In the mean time, the Governor saw him from time to time, and conversed with him on the plan in a very friendly manner. Sometimes he even asked Franklin to dine with him, and this Franklin justly considered a very great honor.

And yet it was the Governor himself, and not Franklin, who was acquiring the highest and most lasting honor through the connection which subsisted between them in this transaction. Franklin rose subsequently to such a height of celebrity and renown, that his memory sheds a halo of splendor over every name connected with his history, and nothing that Sir William Keith ever did will be so long remembered, and be the means of making his name known so extensively, as these simple acts of kindness which he performed for a poor and friendless printer's boy.

The Governor's motives.The voyage.

I think there can be no doubt that it was real kindness and good-will, in some measure at least, that prompted the Governor to act as he did in this affair ; and yet you will find by-and-by, when we learn more of his dealings with Franklin, that you will form a very different estimate of his character than you would be likely to entertain if the story was to end here. You will see in the sequel of this case how intimately good and evil are commingled in the motives of action which govern men in this world, and in their feelings and conduct toward each other.

CHAPTER XII.

VISIT TO BOSTON.

At length the time arrived for the vessel in which Franklin had taken passage for Boston to set sail, and so, bidding his friends in Philadelphia good-by, and taking the letter which the Governor had written to his father in his pocket, he went on board, and the vessel proceeded to sea.

He had a very long passage. In fact, he was a fortnight in getting to Boston. This prolongation of the voyage was owing partly to head winds and unfavorable weather, and partly to various mishaps which occurred to the vessel. One of these mishaps was, they got aground in going down Delaware Bay, and sprung a leak in consequence of it. The leak was not so great as to force them absolutely to return, and so they concluded to go on, and trust to pumping as a means of keeping the vessel afloat till they should reach Boston. They would probably have got along

Franklin takes his turn at the pumps.

His return home.

very well, notwithstanding this, if they had had tolerably good weather; but it was very stormy and rough, and in such boisterous times, a vessel that is at all disposed to be leaky becomes very leaky indeed; for the rolling and pitching of the vessel itself, and the shocks and concussions of the waves in striking it, operate to open the seams and admit a great deal of water. The sailors in this vessel were obliged to pump nearly all the way. Franklin took his turn with them, though, as he was only a passenger, he was under no obligation to do so.

Captain Holmes, the gentleman who had written to Franklin from Newcastle, had not yet gone back to Boston, nor had he written to Franklin's father to tell him where his son was. His not writing was somewhat excusable, for there were scarcely any regular modes of transmitting letters in those days. Consequently, Franklin's return took his father and friends entirely by surprise. They had not heard any thing of him since he went away, and now, after being absent all winter, he suddenly appeared among them, well dressed, and greatly improved in every respect, both in person and appearance. There was that, too, in his air and manner which plainly denoted that he was in a condition of great thrift and prosperity.

His father and mother were greatly pleased to see him.

After explaining where he had been, and giving a general account of what had befallen him during his absence, Franklin took out the Governor's letter, and gave it to his father. His father, on reading it, was very much surprised, but he did not express any opinion in respect to the plan which the Governor proposed. In fact, the idea that a boy, who was only eighteen

Franklin's proposal.

He goes to the printing-office.

His reception.

years of age, and who had run away from home, and had remained away for seven months without letting his parents know where he was, should come back all at once to ask his father to furnish him with money to set up business five hundred miles away, in another country, as it were, for himself—was, it must be confessed, rather preposterous.

After this interview with his father and mother, Benjamin concluded that he would go to the printing-office and pay a visit to his brother James, and to the apprentices and journeymen who were his fellow-workmen. It might have been supposed that, having gone away from his brother's by stealth, and in violation of the contract which he had entered into with him by his indentures, that he would have felt some sense of humiliation and shame in seeing him again—so far, at least, as to assume a modest and unassuming demeanor. But it was not so. He felt, in fact, more disposed to triumph over his brother than to make any acknowledgments or apologies to him, or to manifest in any way a sense of having done wrong. So he walked along the street toward the scene of his former labors with a spirit of pride and triumph in his heart, rather than one of penitence and humility.

He was smartly dressed, and he entered the office with a very independent air and bearing. His brother did not give him a very cordial reception. He looked at him a moment when he came in, exchanged some few words with him, surveyed him haughtily from head to foot, and then turned back to his work again.

Franklin then went to talk with the apprentices and journeymen in the office—his old companions—and began to tell them about Philadelphia. He said, among other things, that at Phila-

Franklin shows the workmen the silver money.

delphia they used silver money, and not bank-bills, as was the custom in Boston, and, to illustrate the subject, he took out a



handful of money and showed them. They gazed at it with great interest, conceiving, undoubtedly, a very high idea of the prosperity and thrift of their ancient comrade, from seeing that his pockets were so full of money. Observe the expression of satisfaction and self-complacency on Franklin's countenance while he is making this display, and the curiosity and interest which the workmen manifest. The figure in the background represents Franklin's brother, who is looking on with a haughty and sullen countenance.*

* We see in this engraving the manner in which the balls, that were described some pages back, are held by the workmen when they are working them together to distribute the ink evenly upon them, before inking the types in the form.

The difficulty between James and Benjamin continues.

In fact, Mr. James Franklin was greatly displeased with Benjamin's demeanor on this occasion, and Benjamin was greatly displeased with *his*. It is not probable that either were at all disposed, as they ought to have been, to manifest a conciliatory and forgiving disposition, and the more morose and sullen Mr. James Franklin was, the more free, and easy, and independent Benjamin became. Finally, he gave the workmen a dollar for a drink in an ostentatious manner, by way of showing his munificence and superiority, and then went away with an air of triumph.

His brother was very much offended with him.

Some days passed away, during which Franklin's father said nothing about the letter which he had received from the Governor, and gave no intimation of what he intended to do in respect to furnishing his son with money to establish his printing-office. At length, Captain Holmes arrived in Boston, and Mr. Franklin asked him what sort of a man Governor Keith was. Captain Holmes gave a very favorable account of him.

"It seems to me," said Mr. Franklin, "that he must be a man of small discretion, to think of setting up a boy in business for himself as a printer—a boy who wants three years yet of being of age."

Franklin was eighteen at this time, and he would not be of age until he was twenty-one.

To this Captain Holmes replied that it was true that Franklin was young, but then he was possessed of a great deal of energy and efficiency of character, and he had no bad habits of any kind. He was sober, industrious, and frugal, and he was, moreover, well acquainted with the printing business in all its departments, and an excellent workman himself.

Mr. Franklin declines the Governor's proposal.

"Besides," added the Captain, "the offer of assistance from the Governor is a very important circumstance, and makes an opening for him of a very favorable character. Very few young men could hope to be so fortunate as to attract the attention of such a man. In fact, the business which it would be in the power of the Governor to put into his hands will almost, of itself, insure his success."

Mr. Franklin shook his head, and replied that he was decidedly against the proposal. So he wrote a civil letter to the Governor, thanking him for the interest which he had taken in his son, but saying that he thought him too young to commence business on his own account, especially as it would require the expenditure of so large a sum of money. He also communicated his decision to his son.

Thus Franklin found himself disappointed in the object for which he had come to Boston, and was obliged to give up his plan.

Mr. James Franklin had, of course, no legal power over Benjamin, since he had canceled the indentures in the manner already explained; and though he had claimed that Benjamin was bound in honor to stay and work with him till he came of age, Benjamin insisted that he was not so bound, being released, as he maintained, from all obligation by the harsh and cruel manner in which his brother had treated him. And now, moreover, Mr. James Franklin did not wish to have Benjamin come back. "Benjamin had behaved," he said, "in so insulting a manner when he came into the office, treating him as he did so disrespectfully before all his workmen, that he never could forget or forgive it." Mr. Franklin, the father, did all he could to pacify James, but in vain; and, finally,

He allows his son to return to Philadelphia.

he gave up all hope of having the two brothers live together in harmony.

When he found that reconciliation was hopeless, he told Benjamin that, if he chose to go back to Philadelphia and work for Mr. Keimer again, he might go, since there seemed to be nothing for him to do in Boston. His father would have had a right to forbid his going, if he had been so disposed, for, although Benjamin had been released legally from all obligation to his brother, his obligation to obey his father still remained, and would remain until he was twenty-one. His father, however, did not object to his going.

"I am very glad indeed," said he, "that you have got along so well in Philadelphia, and that you have been so industrious and careful of your money as to be able to equip yourself thus comfortably in so short a time. And now, when you go back, endeavor to behave respectfully to the people there, so as to obtain their esteem, and not talk proudly and impertinently to your superiors, or lampoon and libel those who offend you, and thus get their ill will."

Mr. Franklin referred in this, probably, to the insubmissive and disrespectful air and bearing which Benjamin had been in the habit of assuming toward his brother, and which had been the cause of so much bitterness and sorrow.

"And when you get back to Philadelphia," continued Mr. Franklin, "be prudent and economical, and save all the money you can, and, by the time you are twenty-one, you will have enough of your own to set you up in business; or, if I find you have nearly enough, I shall very willingly furnish you with the rest. And may God bless you, and make you a prosperous and happy man."

Franklin's preparations for his return.

Benjamin's father, and also his mother, gave him some gifts and tokens of love, and bade him good-by ; and so he set out again on his return to Philadelphia.

CHAPTER XIII.

THE RETURN TO PHILADELPHIA.

FRANKLIN was to sail, as before, in the first instance, for New York, intending to proceed thence to Philadelphia by land. It was more convenient in those days to go from Boston to New York by water, and from New York to Philadelphia by land.

The vessel that he was to sail in was a sloop, and, when the time arrived for her to sail, Franklin went on board with all his baggage.

His baggage consisted chiefly of certain books which he had bought at Boston, and which he was now taking back with him to Philadelphia. He had brought a considerable sum of money with him when he came to Boston—money which Mr. Keimer had paid him for the work which he had done for him in the printing-office. This money amounted to between twenty and thirty dollars. A considerable part of this money Franklin had expended in buying books in Boston, to take back to Philadelphia, and these were the books which he took with him on board the sloop. In addition to these books of his own, he had some, too, which belonged to his friend Collins, as will be explained more fully by-and-by.

Besides the use which he expected to make of his books in Philadelphia, he wished to read some of them on the voyage.

He sets sail.

Newport.

The sloop set sail, and went prosperously down the harbor, and thence stood off across Massachusetts Bay toward the open ocean. After getting far enough to the eastward to clear Cape Cod, the sloop turned to the southward and westward, and, when she got opposite to Narraganset Bay, she turned in toward the land. It was part of the plan of her voyage to stop at Newport, which is a town situated near the entrance to Narraganset Bay. There is a fine beach at Newport, on that part of the shore which is toward the open sea, and, at the present day, this beach is a famous place of resort in the summer time for bathing. Several large hotels have been built there to accommodate the company, and a great many elegant cottages along the shore. There was, however, nothing of this sort at Newport in Franklin's time. The place was then only a small sea-port town, where vessels used to come in to bring merchandise for the colony of Rhode Island, or to seek shelter from any sudden storm that might threaten them when passing along the coast.

Franklin was very glad that the sloop was going into Newport, for two reasons; first, he wished to see what sort of a place it was, and then, secondly, he had a brother settled there whom he wished to visit. This was his brother John. He had always been on very friendly terms with John, and he was now very glad of an opportunity of making him a visit.

The sloop did not stop long at Newport, but set sail again after a short time. There were several new passengers that came on board there. Among these was an elderly lady, a Friend, who was going to Philadelphia, and who took passage in this sloop to New York. She had some servants with her, and she seemed to

The elderly lady and the two girls.

Advice.

be a lady of some consequence. There were also two girls, who were pretty and attractive in appearance, but very gay and very forward in their manners. Franklin soon became acquainted with these new-comers. He assisted the elderly lady about coming on board, and rendered her some other similar services, such as gentlemanly young men are always ready to afford to ladies traveling alone.

Franklin also became somewhat acquainted with the two girls, who seemed very ready to make acquaintance with him, and to spend their time in laughing and talking with him about the deck. At last the elderly lady, who was very grateful to Franklin for the kindness which he had shown her, took an opportunity to caution him privately against too great familiarity with these girls, lest he should get into some difficulty by it.



“Young man,” said she, “I am concerned for thee, as thou hast no friend with thee, and seemest not to know much of the world, or of the snares youth is exposed to; depend upon it, these are very bad women. I can see it by all their actions; and, if thou art not upon thy guard, they will draw thee into some danger; they are strangers to thee, and I advise thee,

in a friendly concern for thy welfare, to have no acquaintance with them.”

Franklin's course.Striking a rock.

In reply to this, Franklin thanked the lady for her kindness, but he said he did not think that the girls were bad girls, though he admitted that they were rather thoughtless and gay. The lady then told him of certain things that she had heard and seen that had escaped Franklin's notice, and convinced him that her suspicions were well founded. Franklin then said that he would be more on his guard, and after this he gradually discontinued his intercourse with the girls; and he had afterward, as we shall see by-and-by, good reason to rejoice that he did so.

At one time during this voyage the whole company narrowly escaped being wrecked, for the sloop grazed a rock, striking it with a heavy, grumbling sound, which greatly terrified all on board. In fact, nothing is more alarming than the concussion which is produced by the striking of a vessel upon rocks or banks of gravel, even when she touches very lightly. It produces a heavy, thumping, and grinding sound, far more violent and frightful than any one would imagine before experiencing it. And even if the vessel gets off immediately, and floats away into deep water, there is always a great excitement and alarm on board for fear that the rocks may have made a hole in the bottom, or started a plank, at least, so as to open a leak; and the first thing always is, in such a case, to rush to the pumps, and see whether any water is coming in. A ship's company are always in a great state of commotion and terror after striking a rock until this point is ascertained.

In the case of the sloop, no serious damage was done except the thorough frightening of all on board; and, after getting away from the rocks, the vessel proceeded safely on her voyage. At length they reached New York. As they were drawing near to

The theft.Franklin's two escapes.

the land, the girls told Franklin where they lived, and invited him to come and see them. He answered them civilly, I suppose, but he determined in his own mind that he would not go.

It was very fortunate for him that he took this course, for as soon as the passengers had landed, the Captain missed some silver spoons from his cabin. He immediately suspected that these girls had taken them. So he sent to a justice, and obtained a search-warrant, and then, taking an officer to execute the warrant, he went to the house where the girls lived, and made a search. The stolen goods were found in their possession, and the young thieves were sent to prison.

When Franklin heard of this, he rejoiced to think what a narrow escape he had had. "If I had continued my acquaintance with them," said he, "after I had been advised to drop it, and especially if I had gone to visit them at their house, the officers would have had good reason to believe that I was their accomplice; and, at any rate, I might have been sent to prison on suspicion."

So Franklin had two escapes in his voyage to New York, one the escape from shipwreck, and the other from being sent to jail as an accomplice of two thievish girls. He considered the last escape as the most fortunate of the two, and I think he was right. What a sad story it would have been to have gone back to his father and mother in Boston, that he had not succeeded in getting to Philadelphia at all, but had been stopped at New York, and sent to jail, on suspicion of having been concerned with two thievish girls in stealing spoons from the cabin of the sloop!

There was another danger, however, which Franklin was des-

Collins's bad character.He goes to Philadelphia.

timed to incur on this journey, in regard to which he was not so fortunate. In fact, he got into very serious difficulty by it. It was a difficulty, moreover, which all young men are more or less exposed to in entering upon life, and which nearly all fall into at some time or other, and suffer severely for. The case was this :

You will remember that, when Franklin first thought of leaving Boston, it was a boy named Collins who planned his flight for him, and made the arrangement with the captain of the sloop which conveyed him away. This Collins now was a very bright and active-minded boy, but he was a bad boy in character, or, at any rate, he was beginning to be bad, and it was very unfortunate for Franklin that he ever had any thing to do with him. Collins had remained in Boston when Franklin came away, and had kept the secret of the place of his friend's retreat very faithfully. When Franklin went back to Boston, and gave such accounts of his success and prosperity at Philadelphia, Collins determined to go to Philadelphia too. He accordingly set out from Boston on his way to Philadelphia a short time before Franklin went, and thus, when Franklin arrived in New York, he found Collins there. The two friends joined company when they thus met, and made arrangements for traveling the rest of the way to Philadelphia together. By thus associating himself with such a young man as Collins, Franklin got himself into a great deal of difficulty, and brought upon himself much sorrow. The story of this trouble, however, furnishes so striking and perfect an illustration of the way in which well-meaning young men often get drawn into difficulty by connecting themselves with the bad, that I think it will be best to tell the whole story by itself in the next chapter, and

Franklin goes to see the Governor.The Governor's library.

finish this by giving an account of the other incidents that happened to Franklin on this journey.

One of the most extraordinary of these incidents was, that while Franklin was at New York, it happened that, for the second time, he attracted the attention of a governor. It was at this time the Governor of the colony of New York, the other, Sir William Keith, having been the Governor of Pennsylvania. The Governor of New York heard of Franklin through the captain of the sloop, in inquiring of him about the passengers that he had brought with him from Boston. The Captain told him that among the passengers there was one who had quite a number of books with him, and who seemed to have a remarkable taste for reading and study. The Governor, hearing this, asked the Captain to bring the young man to his house.



"I have a considerable number of books in my library," said he, "and if he is so much interested in books, perhaps he will like to see them." Franklin accepted this invitation very gladly, and, on going to the Governor's house, was received with great civility. The Governor showed him his library, and had quite a long conversation with him in relation to various books and authors. This adventure pleased Franklin very much indeed.

After staying a short time at New York, Franklin continued his

He arrives at Philadelphia.

Return to Mr. Read's.

journey, traveling across New Jersey, as before, only now he had Collins in company. In due time he arrived safely in Philadelphia, and he immediately informed Governor Keith of his disappointment in respect to obtaining money from his father. The Governor then formed another plan for him, the nature of which I shall explain in the next chapter but one to this, after having finished the story of Collins. The new plan, however, could not be executed immediately, and, in the mean time, it was concluded best that Franklin should return to his old situation in Mr. Keimer's printing-office, and also to his former lodgings at Mr. Read's. He was very glad to see Deborah again, as he had always liked her company. He used to read to her in the evenings, and then talk



with her about what he had read, and other things ; and at last he

He proposes to Deborah.

Bad company.

became so much in love with her, that he asked her if she would be willing to be his wife by-and-by, when he should get established in business, and be ready to be married. She did not give him a decided answer at first, but Franklin thought that she probably would consent after having had time to think of the proposal a little while.

Franklin felt much more quiet and contented in spirit now than he had done during his residence in Philadelphia before. Then, he was burdened with a continual feeling of self-reproach and uneasiness at the thought of the anxiety which he knew that his parents were suffering on his account. They now knew where he was, and had given their full consent to the plans of life which he was pursuing, so that, in respect to that point, his mind was now at ease.

CHAPTER XIV.

BAD COMPANY.

In this chapter I am to give you an account of the difficulty which Franklin got into through his connection with Collins.

Collins was a very intelligent and active boy, and it was on this account, probably, that Franklin first became interested in him. When they first knew each other in Boston they used to read together, and talk together about what they had read, and often they would have discussions on some point of interest in politics or philosophy. Once they had quite a long discussion in writing, each party writing down the arguments on his side of the question, and

Collins's history.

His depravity.

His assistance to Franklin.

sending his essay to the other. The point at issue was whether girls ought to receive as complete and finished an education as boys. Collins thought they ought, Franklin thought they ought not.

Collins was a clerk in the post-office at Boston when Franklin resided there. His duties at the post-office required him to be familiar with the arts of reading, writing, and computing; and perhaps, as there were but very few letters sent by mail in those days, he had considerable leisure for study and for improving his mind. That he must have been quite a bold and forward boy in respect to bad actions, as well as good, is pretty plain from the part that he took in planning Franklin's escape from Boston in the first instance, and from the readiness with which he contrived the falsehood to tell the captain of the vessel, and the cool assurance with which he must have told it to the captain, to lead him to believe it so unhesitatingly. That could not have been his first falsehood.

Although what Collins did in this way was wrong, and indicated a considerable progress in depravity for one so young, yet Franklin could not but feel grateful to him for the assistance which he had rendered him in so important a crisis. If Collins had not assisted him in that way, it is doubtful whether he could have got away at all. After he was gone, too, Collins kept the secret in the most faithful manner. He did not tell any one in Boston where Franklin had gone, or that he knew any thing about it. Thus Franklin considered Collins one of his best friends, and, when he came back to Boston, one of the first things that he did was to go and see his old playmate, and tell him what good fortune he had met with while he had been gone.

His bad habits.

His books.

Franklin's brother.

Franklin found, during his stay in Boston, that Collins had begun to get into the habit of drinking, and was otherwise growing unsteady, and he ought to have resolved, as soon as he learned this, that he would not have any thing more to do with him. Collins, however, being very much pleased with Franklin's account of Philadelphia, and finding that his character and prospects were gradually deteriorating in Boston, determined to go to Philadelphia himself, and Franklin did not discourage this idea. It is very probable, he thought, that a change of scene and employment would be beneficial to Collins, and it might, perhaps, in conjunction with the influence which he himself might hope to exert over him, be the means of reforming him. At any rate, it was agreed that Collins should go to Philadelphia, and he accordingly set off on the journey by land, while Franklin was waiting for his father's decision about the money. Collins left his books, which were quite a pretty collection, for Franklin to bring on with his own by water. It was his having this double quantity of books on board the sloop which particularly attracted the attention of the Captain, and caused him to speak to the Governor about him on his arrival in New York.

You recollect, perhaps, that the sloop in which Franklin sailed from Boston to New York put into Narraganset Bay, and stopped at Newport on the voyage, giving Franklin an opportunity to make a visit to his brother John. Now this Mr. John Franklin had a neighbor in Newport named Mr. Vernon. When Mr. Vernon heard that Mr. John Franklin's brother had come to town from Boston on his way to Philadelphia, he said that he was very glad to hear it, as it would give him an opportunity to collect some

Mr. Vernon's collection.

Collins loses all his money by gambling.

money that was due to him by a man who lived in Pennsylvania, not far from the route by which Franklin would travel. So he came to see Benjamin, and asked him if he would get the money for him. Benjamin said that he would, and Mr. Vernon accordingly gave him a written order to receive it.

"If you get the money," said Mr. Vernon, "let me know, and I will send you word what to do with it."

So Franklin put the order carefully away in his pocket-book, and soon afterward, bidding his brother and Mr. Vernon good-by, he went on board the sloop again, and sailed away.

Collins in the mean time had gone on to New York, and there Franklin, on his arrival in that city, joined him.

He soon perceived, however, very much to his sorrow, that the poor boy was making rapid progress on the road to ruin. He was intoxicated when Franklin first found him, and he admitted that he had been so, more or less, ever since he had been in New York. He had been gambling too, and had lost nearly all his money. He was probably induced to begin to gamble by the bad company that he got into; and then, after gaining some and losing more, until he found that his supply was diminished so much that he had not enough left to carry him through to Philadelphia, he grew desperate, and gambled more than ever, in order to recover what he had lost. But, instead of recovering what he had lost, he only lost more and more. This made him drink more and more, to drown the anguish of mind which he endured when he thought of his guilt and folly, and of the gloomy prospects that were before him. Thus he had brought himself into a deplorable condition. When Franklin arrived in New York, he found that Collins kept himself

Franklin uses Mr. Vernon's money to pay his companion's debts.

intoxicated all the time, and his money was so nearly gone that there was not enough left to pay his bill at the tavern where he lodged, so that, if he were to attempt to go out of town, he was in danger of being arrested and sent to jail.

It must have been a very difficult question for Franklin to decide what he ought to do in such a case. To leave Collins to his fate in New York would seem to be cruel, and yet to pay his debts, and attempt to convey him to Philadelphia, was a desperate undertaking; for to save a young man from ruin, who has advanced so far on the road to it as Collins had gone, has proved, in all countries and ages, a very hopeless task. Franklin, however, determined on making the attempt. So he paid Collins's bills, although by so doing he left himself hardly enough to get to Philadelphia.

In fact, there would not have been enough for them both, if Franklin had not collected Mr. Vernon's money by the way. He was extremely unwilling to take any of this money, as it was not his own, and the converting of it to his own use would be a breach of trust. However, he at length concluded to do so, quieting his conscience by saying that it was a case of necessity. He thought, moreover, that as soon as he and Collins should arrive in Philadelphia, they would both get employment, and could immediately restore the money they had taken.

This is always the way that boys and young men excuse themselves in such a case.

Instead, however, of being able to restore the money in Philadelphia, the case grew worse and worse there, as any one experienced in the ways of the world might have told Franklin would

Collins lives at Mr. Read's.More difficulty.

have been the case. Collins, of course, could not work with Franklin, for he was not a printer. He was a clerk, and he tried to get employment as such in some of the stores, but nobody wished to employ him. Franklin suspected that they perceived by his breath, or by something in his air and manner, that he was in the habit of drinking. At any rate, he could not get any thing to do. All this time he boarded at Mr. Read's, for he had come there with Franklin when they first came to town ; and Franklin, as he had brought him there, as it were, felt compelled to pay his board. Mr. Read had, of course, received him because he saw that he was Franklin's friend, or at least his companion, without making any further inquiry, and it would obviously have been very dishonorable for Franklin to allow Mr. Read to lose his pay.

Besides the cost of his board which Franklin had to pay, Collins came to him from time to time to borrow small sums of money, which money he undoubtedly spent in drinking and gambling, and in other guilty pleasures. You may perhaps think that Franklin might have refused these requests, at any rate. He might have been obliged, it may be said, to pay his board, but he was not obliged to lend him money to squander in wicked indulgences. And yet, on reflection, we shall see that there was great difficulty and hazard in refusing him. So much of Mr. Vernon's money was now gone, that the only hope of recovering it was to get Collins at work, so that he would earn the means of paying the debt. Franklin hoped every day that he would get into employment the next. Collins knew very well that Franklin had money, for he was with him when he collected Mr. Vernon's debt, and Franklin was afraid that, if he absolutely refused to lend

Franklin and Collins quarrel.

The final result.

any more, Collins would get angry, and would refuse to pay what he already owed. So he thought it was best to keep on a little longer, and risk a little more of the money, in hopes by that means to get back what was already gone. Young and inexperienced persons often act on this principle when they get into such difficulties, but the experienced and the wise seldom do so. They call it throwing away good money after bad.

Things went on so for some time, until at length Collins, growing more and more irritable under the influence of drink, began to quarrel with Franklin from time to time, and to become extremely unreasonable. At length, at one time when they were out upon the water together, in a boat on the Delaware, they came to an open rupture, and all the friendship between them was thenceforth wholly at an end.* They scarcely spoke to each other from that time. Before long, however, Collins received some sort of an offer to go to the West Indies, and he concluded to accept it. He promised Franklin that he should pay him what he owed him out of the first money that he should gain, and so he went away.

He was never heard of afterward.

Of course, when Collins went away, he left Franklin in a state of extreme embarrassment and anxiety about Mr. Vernon's money.

The end of the business about the money was, that when, some time afterward, Mr. Vernon wrote to him to call upon him for the money, Franklin did not have it to pay. Instead; however, of prevaricating and evading the demand, or making up some false excuse, he honestly told Mr. Vernon the whole story. He expressed

* For a full account of this difficulty, with a picture of the boys in the boat on the Delaware, see the story of the "STRAIT GATE."

Franklin's honesty.

Practical lessons.

great regret at the thought of having been guilty of such a breach of trust, and said that, if Mr. Vernon would give him time to earn the money, he would repay it as soon as he possibly could do so.

This honest statement of the whole truth of the case was the best thing that Franklin could have done to get out of his difficulty. Mr. Vernon was satisfied, and gave him the extension which he asked, and, in due time, the money was paid.

Remember the story of Franklin and Collins, and learn from it four lessons, which will be of great service to you when you grow up, and go out into the world to act for yourselves as young men.

1. Form no connections of any kind with young men of doubtful character. If you do, they will, sooner or later, involve you in entanglements which will embarrass and distress you, and from which you will find it very difficult to get extricated.

2. If you have money in your possession, especially money belonging to other people, keep the fact to yourself. Tell nobody. By making it known, you invite the thieves that are near you to steal it, and the spendthrifts to borrow it.

3. Never go on lending good money to a bad man, in hopes of making a bad debt a good one. If a man is unable to pay one dollar on account of his idleness and vice, he certainly can not pay two.

4. If you get into debt, or into any other difficulty, an honest, open, and full statement of the whole case to those to whom you are responsible is a far better and more satisfactory way of extricating yourself than any scheme, however cunning, of trickery and evasion. Be open and honest always, especially when you find that you are in the wrong.

Embarking for England.The Annis.

CHAPTER XV.

EMBARKING FOR ENGLAND.

WHEN Franklin, on his return from Boston to Philadelphia, reported to the Governor the unfavorable answer which he had received from his father in respect to his application for money to enable him to set up a printing-office in Philadelphia, the Governor seemed to consider the refusal as a matter of very little moment.

“Very well,” said he ; “if your father is not willing to furnish you with the money, I will do it myself. I will send out to London by the ship, the next time she goes, and purchase the types and the presses, and every thing else that is necessary. You need not give yourself any concern about it.”

The ship which the Governor referred to in this promise was the annual ship which traded between Philadelphia and London ; for in those days all the business between Philadelphia and England was done by means of one ship, and that ship only made one voyage, to and fro, in a year. The name of this ship was the Annis. She was not to sail until the fall, and, as it was then midsummer, there was nothing that could be done immediately, in respect to carrying the Governor’s magnificent offer into effect, but to arrange and mature the plans that related to them.

The Governor accordingly requested Franklin to make out an inventory of what he would require to set up his printing-office, and Franklin did so. The amount of this inventory was about a

The Governor's offer.

Another voyage.

hundred pounds, which is very nearly five hundred dollars. Franklin showed this inventory to the Governor, who, on examining it, seemed well satisfied with it, and promised to provide funds sufficient for purchasing the articles.

"But," said he, when talking with Franklin on the subject one day, "would it not be better for you to go out yourself to London, and so select what you require on the spot? You can then see for yourself what there is there for sale, and choose what will be best adapted to your purpose."

Franklin thought that this was a very good plan, and was very ready to accede to it.

"Then, besides," said the Governor, "when you are there, you can make acquaintance, and establish correspondence in the book-selling and stationery line, and this will be of great service to you in your future business."

Franklin admitted very readily that these would be great advantages.

"Very well," said the Governor; "let it be so settled, then; and get yourself ready to go with the *Annis* when she sails."

So it was agreed that Franklin was to go to London. The making of such a voyage was a very great undertaking for one so young.

During the interval which was to elapse before the sailing of the vessel, Franklin continued to work at his trade in Mr. Keimer's office, just as he had done before he went to Boston. He used, however, often to go and visit the Governor, who received him kindly, and paid him no little attention, and always, when he went away, invited him to come again.

Franklin's discretion.

Letters of introduction.

All this time Franklin was very careful to keep this, his plan of setting up a printing-office of his own, entirely secret, as various contingencies might occur to prevent the realization of it, and, in that case, it would be better not to have it known that he had entertained any such design. A weak-minded boy, under such circumstances, would have talked to every body about his plans, and have boasted continually of his intimacy with the Governor, and thus, perhaps, have spoiled all by his foolish indiscretion and vanity.

Franklin had several companions of about his own age at this time in Philadelphia, with whom he was accustomed to read and walk, and who joined with him in various plans for literary improvement. One of these young men, whose name was Ralph, was afterward the means of getting Franklin into considerable difficulty, as we shall see in the sequel. One might suppose that Franklin would have learned sufficient wisdom by his connection with Collins to avoid such entanglements thereafter. But it seems he did not.

At length the time drew nigh when the vessel was to sail. The Governor had promised to give Franklin a number of letters of introduction and recommendation to friends of his in England, and also a letter of credit, which last was to furnish him with the means of making his purchases.

A letter of introduction is one addressed to some friend, requesting him to show kindness and hospitality to the bearer of it, and to give him such general advice and assistance as he may require.

A letter of credit is one addressed to a banker or business agent, who has money belonging to the writer of it, requesting him to

Letters of credit.

The two compared.

pay to the bearer of the letter a certain sum named, or such portion of it as he may require.

Any man can give letters of *introduction* to a friend going to any country, provided that he has acquaintances in that country to whom it is proper for him to introduce his friend.

But no man can give letters of *credit* unless there is some one there who has money belonging to him, or who is willing to pay money for him.

Now the governors of the colonies in those days, and other influential persons, were accustomed to keep their money in a great measure in England, for it was there that they wanted it chiefly—their most important purchases being made in London. So, when their salaries were paid, the money went into the hands of their agent in London, and any other money that was to be paid to them for the rents of their property in England, or that was due to them in any other way, was received by him, and the governors drew for it as they wanted it by letters of credit and bills of exchange.

Sometimes these persons would require so much money in England, or would draw so much during some particular period, that they would expend the supply in their banker's hands. Then, before they could draw any more, it was necessary to wait until a new quarter's salary came in, or their funds in the banker's hands were replenished in some other way.

Now the Governor had promised Franklin both letters of introduction and a letter of credit. It was obviously better that Franklin should take a letter of credit than to carry out actual money, as the letter could be conveyed with much less trouble than a bag

The Governor delays giving Franklin his letters.

of gold, and besides, the danger of losing the money by accident or by robbery was thereby avoided. So Franklin was well satisfied with the arrangement which the Governor proposed to make for him, and he considered himself very certainly and fully provided for.

It seems, however, that he was destined to be very grievously disappointed. Whether it was that the Governor had seen some reason to change his mind, or at least to doubt and hesitate about carrying out the plans which he had formed for his young client, or that his stock of funds in the hands of his banker in London had run low, or that he had been wholly insincere and hypocritical in his professions of friendship and offers of aid from the beginning, or that he had taken an interest in Franklin only from good-natured caprice, and from the vanity of considering himself a patron, and now, when the time had come to act in earnest, his fancy changed —whichever of these may have been the explanation of the case, the fact was, that when the time arrived for the Annis to sail, the Governor proved himself wholly unable or unwilling to fulfill his promises. The results of this failure would not have been so bad, if the Governor had frankly told his young charge that he had altered his mind, and that the voyage must be given up. But he did not do this. When Franklin called for his letters, the Governor told him that they were not ready, and asked him to call again. He did call again at the appointed day, but still they were not ready. The Governor, however, assured him that they would be ready in time, and that he need not give himself any uneasiness about them, but must go on with his preparations, and get ready to go on board. At last the time arrived for the ship to sail. Frank-

Newcastle.

The sailing of a ship for England a great event.

lin took leave of his friends, sent his baggage on board, and went to the Governor's for the last time, to receive his letters, and bid his patron good-by.

Instead of being invited in, however, to see the Governor himself, when he knocked at the door of his house, the Secretary came out to him, and told him that the Governor was very busily engaged in closing up his dispatches to go by the ship, and could not see him then.

"But," he added, "his Excellency is going down to Newcastle by land, and you can come on shore and see him there, for the ship is to stop at Newcastle."

The sailing of a ship from Philadelphia to London, which is now an every day and comparatively unimportant occurrence, was in those times a very great event, and it attracted universal attention. Hundreds of people were accustomed to assemble on the shores to see the ship set off, and those who had friends on board, or who had important commercial or political communications to make to people in England, would often go down the river to Newcastle, so as to go on board the ship there, in order that they might deliver their letters to the captain at the last moment, and take a final farewell of their friends immediately before their departure from the country. There was, therefore, nothing unusual or strange in the Governor's intending to go to Newcastle, and nothing in this proposal that was calculated at all to excite Franklin's suspicions. Newcastle was about forty miles below Philadelphia.

So Franklin, supposing that all would be right in the end, although he felt no little uneasiness at these repeated disappointments and delays, bade his friends good-by once more, and em-

Franklin embarks.He bids Deborah farewell.

barked on board the ship. He took a very kind leave of Miss Deborah when he went away from her father's house. They had



become engaged to be married, but it was thought not prudent that they should be married until after Franklin should have returned from London, and become established in business for himself.

The ship weighed anchor as soon as all the passengers were on board, and went slowly down the river to Newcastle. Newcastle lies, you will recollect, about forty miles below Philadelphia, not

The governor promises to send Franklin's letters to the ship.

Mr. Ifhamilton.

far from the head of Delaware Bay. It is on the opposite side of the river from Philadelphia. The ship came to anchor in the river opposite the town, and Franklin went on shore. He found that the Governor had arrived, but when Franklin went to his lodgings to call upon him, the Secretary came out again, and told him that he was extremely sorry to say that the Governor could not see him, being then engaged in business of great importance "But," added he, "he will send the letters to you on board the ship."

So the Secretary bade Franklin good-by, wished him a very pleasant voyage and speedy return, and Franklin went away. He was somewhat puzzled at these strange proceedings, but still he had no doubt that it was all right, and so he went on board the ship again with good courage

The passengers who had taken berths on board the Annis were the following persons:

First, there were a certain Mr. Hamilton and his son. Mr. Hamilton was a distinguished lawyer of Philadelphia. He engaged passage in the ship, and sent on board a great supply of provisions and stores for the voyage; but he did not go after all, for, just before the vessel was to sail, there came down a message to him from Philadelphia to say that he was wanted to plead a very important law case that had arisen there suddenly, about a vessel that had been seized, and the parties who wished to engage him offered him so large a fee that he concluded to give up his voyage. So he gave the rest of the passengers permission to use the provisions and stores that he had put on board, and which it was now too late to put on shore again, and he and his son went back to Philadelphia.

The passengers	The steerage and cabin compared.
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Another passenger was Mr. Denham, a Friend, and a Philadelphia merchant. Mr. Denham and Franklin became quite intimately acquainted during this voyage, and their friendship continued afterward as long as Mr. Denham lived. We shall hear more about this gentleman in the sequel.

There were two other passengers, named Oniam and Russel. They were the masters of an iron foundry in Philadelphia, and were going out to England on business connected with their works.

Franklin's friend Ralph, the young man who has already been mentioned, was also a passenger.

As soon as he learned that Franklin was going to England, he determined to accompany him on the voyage. The reasons which led him to do this will be explained by-and-by, when we come to speak more particularly of Franklin's connection with this young man.

The gentlemen passengers above named had taken all the berths in the cabin, so that there was no room for Franklin and Ralph there. The two young men were obliged, therefore, to take berths in the steerage. The steerage is a part of the ship far less convenient and comfortable than the cabin, and it is generally taken by an inferior class of passengers. They are called steerage passengers usually, and the cabin passengers very often look down upon them as to persons of an entirely subordinate rank in life.

The people who had engaged the cabin berths were at first disposed to treat Franklin and Ralph in this way, thinking that they were probably poor young men who occupied some very

Colonel French brings the dispatches.

humble position in life. At length, however, Colonel French came on board the ship. Colonel French, it will be recollected, was the friend of the Governor, the gentleman who had accompanied him on his first visit to Franklin in Mr. Keimer's office. He came on board the ship now to bring the letters and dispatches which the Governor had prepared, and which the captain of the ship was to take to England. As soon as he saw Franklin, he went to him and accosted him in a very cordial and friendly manner, much to the surprise of all the cabin passengers. They immediately concluded that a young man, for whom such a functionary as the Colonel entertained so high a regard, must be a person of some consequence, and they immediately began to treat both Franklin and Ralph with much more respect and consideration than before. In fact, when it was ascertained that Mr. Hamilton and his son had concluded not to proceed on the voyage, and that, consequently, the berths which they had taken were at liberty, they sent to inform Franklin and Ralph of the fact, and to invite them into the cabin. The young men very gladly accepted this invitation, and so they were soon established in very comfortable quarters, and on a footing of equality with the other passengers.

Soon after Colonel French had delivered his letters and dispatches, Franklin told the Captain that there were some among them intended for him, and he asked leave to look over the parcel and take his letters out. They were letters of introduction, he said, and a letter of credit, which the Governor had intended that he should deliver personally in London. The Captain said that the Governor's letters had been put into the great letter-bag in his cabin, with all the other letters that were going to England,

The ship sets sail.Franklin examines the letters.

and that he could not conveniently get at them then, in the midst of the bustle of weighing anchor and setting sail.

“But,” said he, “when we get fairly out to sea, and become somewhat settled on board ship, you will have plenty of time. You can then look over all the letters, and take out such as you find are intended for you.”

Franklin was satisfied with this arrangement, and so dismissed all care and concern about his letters from his mind. The sailors hoisted the anchor and spread the sails, and the ship passed down the river into Delaware Bay, and thence out between the Capes of the Delaware into the open sea, and thus commenced her voyage.

CHAPTER XVI.

LONDON.

THE passage of the ship Annis, on this occasion, was a very rough and uncomfortable one, for it was late in the season when she sailed, and the wind was ahead and the sea was boisterous nearly all the way. In consequence chiefly of this bad weather, and of the sea-sickness which resulted from it, Franklin had no good opportunity to look over the letters in the Captain’s letter-bag till the ship entered the English Channel. As the time of landing was then, of course, close at hand, the business could no longer be delayed, and Franklin accordingly asked the Captain to allow him to examine the contents of the bag. So the Captain gave him the letters, and Franklin spread them out on the cabin table and looked them over.

His disappointment.

He arrives at London.

He expected to find that those which were intended for him would have been inclosed in envelopes addressed to him, or, if not, that at least his name would have been put upon the corners of them ; but, to his surprise and disappointment, he found that there were no letters marked for him in any way. He still had no doubt that the Governor had written letters of introduction and a letter of credit for him, and that these letters were among the rest in the bag. The difficulty was to find out which they were. So he looked over all the letters again very carefully, to see if he could ascertain from the handwriting, or by other indications, which were his.

He selected six or seven which he thought must be his ; or, rather, if they were not all his, he felt confident that his letters, if there were any for him, must be among these. He judged partly from the handwriting on the outside of the letters, which seemed to him to resemble the writing of the Governor, and partly by the persons to whom the letters were addressed. One was to a certain stationer, and another to the King's printer.

"These two must certainly be mine," thought Franklin.

He concluded, on the whole, to take all the letters that he had laid out.

"If any of them should not be mine," thought he to himself, "my taking them will do no harm, for I shall deliver all as soon as I land, and so each man will get his letter just as soon as if I were to leave them in the bag."

Franklin was mistaken in supposing that any of these letters were his. They were none of them his. The faithless Governor had not written him any letters at all.

At length the ship arrived in London, and the passengers landed.

Appearance of London.

The shipping.

The streets.

The scene which presents itself to the eye of an American boy, on landing in London for the first time, is extremely bewildering. The ship, in approaching the city, of course comes up the River Thames, which, though quite a wide river, is so crowded with ships, brigs, and every other kind of vessel, that it is quite difficult for any one newly arrived to make their way among them. Besides these vessels, there were in those days an innumerable multitude of wherries, which were busily plying in all directions to and fro, from ship to ship, or from one side of the river to another.

The scene presented to view in the streets was, in some respects, even still more bewildering. The crowded sidewalks, the infinite number and variety of vehicles, the endless maze of streets, the rows of massive warehouses, the spires, and domes, and columns which were seen rising here and there from among the other buildings of the city, and, above all, the thundering din, which sounded, incessantly, like the roaring of a cataract, must have wellnigh overwhelmed our young adventurer with wonder.

Through the midst of this scene Franklin and his companion landed and proceeded to an inn. As soon as they were comfortably established, Franklin dressed himself neatly and went to deliver his letters. The first one that he took was the one addressed to the stationer. Now it happened that this letter, notwithstanding the appearance of the handwriting, had not been written by the Governor, but was the production of a young lawyer of Philadelphia named Riddlesden. This Riddlesden, it seems, was quite an unprincipled man, and though he had formerly had some dealings with the stationer, he had at last been found out, and the stationer had determined to have nothing more to do with him.

The stationer's reception of Franklin.

Riddlesden.

So, when Franklin went into the stationer's shop, and delivered the letter, he expected to receive a very cordial greeting from the stationer as soon as he should have an opportunity to inspect the contents of it. Instead of this, the stationer just opened the letter, glanced at the signature, and then immediately said,

"Oh ! this is from Riddlesden ;" and, without stopping to read any thing more, he put the letter back into Franklin's hands, adding,

"I have lately found that Riddlesden to be a complete rascal,



and I will have nothing more to do with him, nor receive any letters from him."

Franklin was quite confounded at hearing these words. He had confidently believed that this must have been a letter from

Franklin alone in a strange city.

He asks advice of Mr. Denham.

the Governor, introducing him to the stationer, and, being disappointed in this case, he began to doubt in respect to all the other letters. He, however, proceeded to deliver them to the persons to whom they were addressed ; but it proved that they had none of them been written by the Governor, and none of them made any mention of him.

Franklin was at first greatly perplexed at making this discovery, and he did not know what he should do. He was in a great and strange city, three thousand miles from home, without friends and without money. He had not even paid his passage out, having relied for every thing on the letter of credit which the Governor had promised him.

But, though Franklin was thus without friends, without money, and without credit, he had still one grand resource left. He had a trade. He was a good printer, and so, notwithstanding the difficulties and dangers in which he found himself involved, he was not, after all, very much cast down. He was, however, somewhat at a loss to know what it would be best for him to do, and he concluded, on the whole, to go and take the advice of Mr. Denham, the Philadelphia merchant who had been his fellow-passenger and friend on board the vessel.

He accordingly went to see Mr. Denham at his lodgings, and, on telling him the story, Mr. Denham laughed quite heartily.

“That is exactly like Governor Keith,” said he. “He is always full of good promises to every body that needs help, but he never fulfills them. He is a vain, self-important, and boasting man, good-natured enough, it is true, and well-meaning, but you can not place the least reliance on any thing that he tells you. There is no

Franklin finds himself in a situation of perplexity.Mr. Palmer's.

probability that he has written you any letters whatever, either of introduction or of credit. Nor, if he had written them, would they have been of any use to you. He has no money in England, and there is nobody here who would advance any money for him on any account."

Thus all young Franklin's fine hopes and expectations fell to the ground, and he found himself thrown wholly upon his own resources in a foreign land, where every thing was new and strange to him.

He asked Mr. Denham what he thought he had better do.

Mr. Denham advised him to get work, if he could, in some printing-office.

"You can remain here for a time," said Mr. Denham, "and work in the printing-offices of this city, and thus you will become acquainted with the improvements which have been made, and make progress yourself in the art, so as to set up with greater advantage when you go back to Philadelphia."

Franklin thought that this was very good advice. He immediately began to make inquiry among the different printing-offices for work, and very soon made an engagement with a man named Palmer, and went to work at once in his office.

Mr. Palmer's establishment was not a very large one, and the wages paid to the journeymen who worked in it were not high. Franklin thought, however, that it would be better to go there, for a time at least, until he could find some more favorable opening, rather than to be idle.

Fortunately, there was a book-store next door to Mr. Palmer's printing-office. The man who kept this book-store was named Wilcox. Franklin went into this book-store, and began to look at

Mr. Wilcox.

Franklin's prospects.

Ralph.

the books, and in so doing he became acquainted with Mr. Wilcox.



He told Mr. Wilcox who he was, and how he came to be in London, and Mr. Wilcox was so much interested in him on account of his frank and agreeable manners, and his intelligent conversation, that he gave him leave to take any of his books to read, on condition that he returned them again when he had done with them. This pleased Franklin very much. Thus he was very fully provided for in every respect. He had good and profitable employment during the

day in the printing-office, and was furnished with the means of intellectual occupation for the evening, in the books which he borrowed at the book-store. In a word, his condition and prospects were very good, and he would have done very well if it had not been for his connection with Ralph. The difficulties which he got into on this account will be made the subject of the next chapter.

CHAPTER XVII.

RALPH.

RALPH, though he was still a young man when Franklin became acquainted with him in Philadelphia, was married, and he had one child. He was a very intelligent and well-informed man, but un-

Ralph's character.His resolution to become a poet.

principled, and somewhat inclined to idleness and dissipation. This made him a very dangerous companion.

He was, moreover, as such persons often are, a very agreeable companion. He was very ingenious, and his conversation was full of vivacity and wit. Franklin liked his company very much while he lived in Philadelphia. He was accustomed often on Sundays to make excursions with him into the country, along the banks of the Delaware River. Sometimes the two friends would go on foot on the land, and sometimes in a boat on the water. They would take books with them, and when they were tired of walking they would sit down under the trees and read, pausing now and then in their reading to talk about the sentiment of their author, or the

language in which it was expressed. In these conversations, Ralph displayed so much brilliancy, vivacity, and wit, that Franklin found him a very fascinating companion.

Ralph was very fond of poetry, and at length he began to write verses himself. He was pleased with the success of his first efforts, and soon formed a resolution to become a poet by

profession. Franklin endeavored to dissuade him from this. He told him that writing poetry was a very agreeable pastime for leisure hours, but that it was very unwise to look forward to it as the business of life. But Ralph could not be diverted from his purpose.



Ralph's abandonment of his wife and child.

Ralph did not live happily with his wife. He not only disagreed with *her*, but he quarreled also with her family and relatives; and finally, when he learned that Franklin was going to London, he determined to go with him, and abandon his wife and child. His plan was to let them go home to her father's, under the pretext that he was going to London only for a short time, and that he would soon return and take them back to his house again; while his secret intention was to settle permanently in England, and never return. He thought that the prospect of attaining to fame and fortune as a poet would be greater in England than in America, and that, at any rate, by leaving the country, he should get free from all further responsibility and care in respect to his wife and child. In justice to Franklin, however, it ought to be said, that Ralph did not let him know that, in going to England, he was intending to abandon his wife and child, and never to return. If he had done so, Franklin would perhaps have endeavored to prevent his friend from acting in so heartless and wicked a manner.. Franklin knew nothing of this plan until he and Ralph reached London, and had got settled together in their lodgings there. Then Ralph told him.

The lodgings which the two friends engaged were very cheap; they were situated in an obscure part of London called Little Britain. The young men paid only about a dollar a week each to the landlady, which shows that their accommodations must have been of a very humble character. This was as much, however, Franklin thought, as they could afford.

For, although Franklin himself was pretty well provided for in respect to employment, Ralph was wholly destitute, as yet, of any means of support. He found some relatives in London, but they

Ralph's gentility.

His different plans.

Their failure.

were very poor, and could not help him. He had no money at all. Nor had he any trade. He could write a handsome hand, it is true. In fact, his business in Philadelphia had been that of a clerk, so that all he knew was how to keep books and copy letters. And even if he had been acquainted with any trade, it is probable that his ideas were too lofty and poetical to have allowed of his working at it. His taste was for some much more genteel occupation than working with his hands in any way.

His first plan was to apply at the theatres, in order to be employed as an actor. He thought that he had decided talents for the stage, if he could only have an opportunity of displaying them. So he went to one of the theatres, and offered himself to the manager. The manager heard him read some passages from a dramatic author, as is usual in such cases, by way of trial, and then told him that he had better give up all thoughts of ever appearing on the stage; as it was utterly impossible that he should succeed. He had no talent whatever, the manager said, for acting.

Ralph, somewhat chagrined at this disappointment, next conceived of the idea of establishing a sort of periodical paper, to appear once a week, in which he expected that his talents as an author would shine so resplendently as to attract the attention of the town, and bring him a great deal of fame and money. He proposed his plan to one or two publishers, but they could not be induced to undertake it.

All this time Ralph was living, of course, at Franklin's expense. Franklin was not only obliged to pay for his board and lodgings, but also to lend him money, from time to time, to enable him to pay his other expenses. Besides this, Ralph enticed Franklin

He gets into difficulty.

His connection with the milliner.

away to theatres and shows, and other public amusements, by which a great deal of useful time was spent, and much money wasted. During all this period Ralph was endeavoring to quiet Franklin's uneasiness by assuring him that he should soon get into some profitable employment, and then he would repay what he owed him, and all would go on well again.

At length, however, the funds of the two young men had become so nearly exhausted, that Ralph began to think he must find some employment or other, without any longer delay ; and so he made application at the lawyers' offices for a situation as clerk to copy deeds and letters ; but he could not find any vacancy. He made other similar applications in other quarters, but all in vain, and the two friends were thus soon reduced to great straits. Franklin's earnings would have been abundant for himself, but they did not suffice for two.

In fact, there were three to draw upon them ; for Ralph, in the mean time, with the recklessness for which such characters are always noted, had formed a connection with a young woman, a milliner, whom he became acquainted with at their lodgings, and whom he finally concluded to live with as his wife. He could not really marry her, for he had a wife already in America, who was still living. If he had caused the marriage ceremony to have been performed, it would have been invalid ; and then, besides, by so doing, he would have rendered himself liable to a very heavy punishment for the crime of bigamy, as it is called. So he took the girl without marrying her, and went with her to another lodging, and lived with her there.

The connection of Ralph with Franklin ended at last just as

Ralph goes into the country.Franklin and Ralph quarrel.

such affairs almost always end. Ralph, after borrowing from Franklin until his friend's means were entirely exhausted, and having expended, probably, besides, all that he could get from the unhappy milliner, concluded to leave London, under pretense of finding employment somewhere in the country, and promising to send back the amount which he owed Franklin as soon as he could possibly earn the money. In the mean time, he left the milliner and her young child under Franklin's care. After he had gone, Franklin heard from him from time to time, his letters containing long extracts from a poem which he was composing, but no money. At last he found cause to quarrel with Franklin about something connected with the milliner, and he declared that Franklin had behaved so unhandsomely and improperly, that he considered himself freed from all obligation to pay him the money that he owed him. Thus this most unfortunate friendship came to an end. Franklin, though very much vexed and chagrined to think how grievously he had been imposed upon, was very glad to be relieved of his burden at last, and, seeing that he was now to have only himself to take care of, his hope and his courage revived.

The amount of money which Ralph owed Franklin at the time of their rupture amounted to over a hundred and fifty dollars.

Franklin out of difficulty.The printing-office described.

CHAPTER XVIII.

THE END OF BOYHOOD.

WHEN Franklin found himself finally clear of his entanglements with Ralph, he immediately set at work with new zeal and energy to repair and retrieve the ground that he had lost. He left the printing-office in Little Britain, and made a new engagement in a larger establishment, near Lincoln's Inn Fields. The name of his new master was Watts.

In Mr. Watts's printing-office, as in all others, there were two departments, the composing-room and the press-room—the one being the room where the types were set up and arranged for printing, and the other where the sheets of paper were printed from them. The pages of type, when a sufficient number had been set up for one side of a sheet of paper, were wedged up very tight in an iron frame, which had as many compartments in it as there were pages. These frames, thus filled, were called *forms*. When the forms were ready, they were carried from the composing-room up to the press-room, and there, being placed on the presses, the sheets of paper were printed from them. The press-work in large establishments is now mostly done by steam-power. In Franklin's time, however, it was done by hand. The men who worked the presses were called *pressmen*. Those who were employed in composing-rooms, setting up the type, were called *compositors*.

The whole printing-office was called the chapel. Printing-offices received that name in England in those days on account of the fact

Chapel laws.

Welcome-money.

The inveterate topers.

that the first printing-office was in a building which had once been a chapel. The workmen in these offices had various laws, and usages, and customs, established among themselves, which they called the *chapel laws*.

One of these laws was, that every new-comer must pay five shillings—a sum which was equal to about a dollar and a quarter—for what they called “welcome-money.” The money thus paid by the new-comers was spent by the workmen in drink.

When Franklin entered Mr. Watts’s office, he went first into the press-room, to work one of the presses. He paid his five shillings welcome-money, and the workmen drank it in strong beer.

He soon found, moreover, that all the workmen in the office were in the habit of drinking a great deal of this beer. There was an alehouse near by, and there was a boy belonging to it always in attendance at the printing-office to go and get beer for the workmen. Franklin’s companion at the press—for it required two to manage a press, one to work the balls and apply the ink, and the other to put on the paper and make the impression—was a most inveterate toper. He used to drink a pint of beer before breakfast, a pint at breakfast with his bread and cheese, a pint between breakfast and dinner, a pint at dinner, a pint in the afternoon about six o’clock, and another pint when he had done his day’s work. Franklin endeavored to convince this young man, and also the other workmen in the office, that this was a very bad custom. They said that they needed strong beer to make them strong to do their work, for press-work, and the carrying about of forms of type, is very heavy work. But Franklin maintained that all the strength which they could derive from the beer must be from the nourish-

Franklin's argument against drinking.

His strength.

ment that it contained, and that this must depend upon the quantity of barley or other grain employed in the making of it, and that there must be more of this nourishment in a single pennyworth of bread than in a whole quart of beer. In confirmation of his doctrine, he let them see that he, who drank nothing but water, could



take two forms of type, one in each hand, and carry them up stairs without any difficulty—a feat which none of the old beer-drinkers could perform.

The bad effects of drinking.Franklin in the composing-room.

Besides undermining their health and diminishing their strength by their unwholesome potations, these men had to lose four or five shillings out of their wages every Saturday, to pay for the beer they had drunk during the week. This kept them always poor, while Franklin, who saved this money, was gradually getting quite a surplus on hand.

The men saw that these things were so, when Franklin pointed them out to their attention, but still they would not follow his example, at least for some time. They had become so accustomed to the drink that they could not easily give it up. So they laughed at Franklin for his abstinence, and called him the *water American*. At last, however, one after another were convinced of the folly of the course which they were pursuing, and reformed.

After Franklin had been some time in the press-room, Mr. Watts wished to transfer him to the composing-room. Franklin made no objection to this change, but, when he entered the composing-room, the men who were there called upon him for a new payment of welcome-money.

"No," said Franklin, "I have paid my welcome-money already. I paid it in the press-room."

The men replied that the payment was only for the press-room, and that he must pay another now on entering the composing-room. That, they said, was according to the chapel laws. Franklin, however, still refused, and finally he appealed to Mr. Watts to know whether he was under any obligation to pay his welcome-money a second time. Mr. Watts said that he was not, and forbade his paying it.

The men, however, were determined not to give up the point,

The chapel ghost.

Franklin pays the welcome-money.

and so they began teasing and tormenting Franklin all in their power, by playing tricks upon him when he was away. They would mix up his types, so as to cause him a great deal of trouble in sorting them again, and knock down what he had set up. Sometimes they would transpose the lines of type on one of his pages, so as to make nonsense of it all, and so give him a great deal of trouble in finding out what the difficulty was. All this was a great damage to Franklin, and a cause of loss, for each workman in a printing-office is paid, not by the day, but by the amount of work that he gets done. When Franklin inquired who it was that did all this mischief, the rogues would tell him that it was the *chapel ghost*. There was a chapel ghost, they said, that came in when the workmen were away, and punished, by such means as these, the journeymen who would not obey the chapel laws.

Franklin found, at last, that it was best for him to yield to the demand of the workmen, unjust as it was, and so he paid the money.

Cases of the kind occur to all men in passing through life, in which they are compelled to submit to injustice. When such cases arise, the sooner we find out that we must submit, and so give up our resistance, the better it is. We have a right to resist injustice, when it is in our power to make our resistance effectual; but if this is not in our power, the sooner and the more good-naturedly we yield, the more easily we shall get out of the difficulty. If, for instance, in this case, Franklin had foreseen that he would be obliged to give up in the end, he might have said to the men in the beginning, "I think your claim is unjust; but, since you insist upon it, I shall submit, and pay the money." This

Franklin's influence.His industry and diligence.

would have saved him a great portion of the mortification which he subsequently endured ; for it is much more mortifying to one's pride to have to yield at last, after attempting to make resistance, and finding one's self overcome, than it would be to give up at once, without any struggle, in the beginning.

After this, Franklin, being now on good terms with his brother workmen, rapidly rose to a high degree of consideration and influence in the office. He was a very amusing and entertaining companion, and the journeymen in the office liked his society very much. Thus he aided them in various ways. If they were out of money, he would lend to them—they pledging to him the wages which they were to receive on the next Saturday night for the payment. He was also very industrious and faithful in all the duties of the office, so that he soon became as great a favorite with Mr. Watts as he was with the journeymen. Many of the workmen would go off on excursions and frolics on Sundays, and then, not feeling like returning to their work on Monday, they would stay away on that day too. This Franklin never did. He was, besides, a very rapid compositor, and was continually taking pains to improve more and more, so that, what with his skill and what with his diligence, the work that was put into his hands was generally done very quick and very well. The consequence was, that when Mr. Watts had any piece of work that he required to be done with special care or with unusual dispatch, he would put it into Franklin's hands ; and as this sort of work was better paid than the other, Franklin found that his income was increasing in every way.

He was as successful, too, in gaining the good opinion of those

Franklin chooses his lodgings.

His good character at home.

who were connected with him at home as at the office. The lodgings that he and Ralph had taken at first in Little Britain were too far away from Mr. Watts's printing-office, and so Franklin applied to a woman who had lodgings nearer. Her rooms were up three flights of stairs, over a great warehouse. When Franklin applied to her to let a room to him, she did not give him an answer immediately, but sent first to inquire about his character at his previous lodgings. She heard so good an account of him there that she agreed to take him on the same terms. She was a Catholic woman,

though she had been bred a Protestant, and she was somewhat advanced in years. She was lame, so that she very seldom went out, and one reason why she wished to take a lodger was, that it would be pleasanter for her to have a young man to sleep in the house, as her family consisted only of herself, and her daughter, and a maid-servant.

This woman was very much pleased with her lodger as soon as she became acquainted with him, and she found him, besides, of very



little trouble in her house. He always came in in good season at night; he never was rude or noisy; he brought no disagreeable company home with him; and he often amused the good woman and her daughter by talking to them and reading to them in the evenings.

The nunnery in the garret.

Franklin's economy.

Franklin's landlady had but a very small circle of acquaintances and friends, but there was one among them whose case was somewhat extraordinary. This was a woman who belonged to the Catholic Church, and had been sent when young to the Continent to live in a nunnery ; but, as the climate did not agree with her

there, she had returned to England ; and, since there were no nunneries in England, she determined to make a sort of nunnery for herself by living in a garret, and devoting all her time to devotion and to works of charity. Franklin visited this woman once in her lonely home, and found her making garments for the poor. She



seemed quite contented and happy.

Franklin liked his lodgings very well, but after a time he heard of a place where he could have accommodations for two shillings a week, instead of the three and sixpence which he was there paying, and, as he was very desirous of living in as economical a manner as he could, in order to lay up money for his future plans of life, he told his landlady that he thought he ought to go to the new place. But she said that she could not consent to his going away on any account, and that, if he would stay, she would take him thereafter for even less than the two shillings. She would

Franklin's asbestos purse.

Its remarkable qualities.

Sir Hans Sloane.

only charge him one and sixpence. So Franklin concluded to stay, and he continued accordingly in these lodgings as long as he remained in London.

Franklin seemed to have an extraordinary fortune for making the acquaintance of great men during all the early part of his life. Among other instances of this, he was introduced, while he was in London at this time, to a very distinguished naturalist and philosopher, named Sir Hans Sloane. This gentleman was making a collection of specimens of natural history, and of curiosities of all kinds. Franklin had in his possession a purse made of *asbestos*. Asbestos is a mineral. It is fibrous in its texture, and in some specimens it is so fine that it can be spun into thread, and then the thread may be knit or woven into cloth. Now the fibre being a mineral substance, and of a kind, too, not destructible by any ordinary degree of heat, the cloth, or the knitted fabric made from it, may be put into the fire without any injury, the heat only serving to cleanse it of its impurities. It comes out of the fire looking brighter and better than when it went in.

Sir Hans Sloane happened to hear that Franklin had a purse of this material, and he sent to request that he would bring it to his house and show it to him. Franklin accordingly went, and Sir Hans Sloane, on seeing the purse, wished to purchase it, in order that he might add it to his collection. He offered so large a price for it that Franklin concluded to accept the proposal.

The collection of Sir Hans Sloane was purchased, after his death, by the British government, and it formed the commencement of the immense cabinet now known all over the world as the British Museum.

Plan for returning to Philadelphia.

Learning to swim.

Empiricism.

Franklin continued to live in London in this way for about eighteen months, and then a plan was formed for his return to Philadelphia. He was now nearly of age, and in the proposal which was made to him to go back to America, he was considered and dealt with as a man, and so we may here properly consider his boyhood as being ended. Before closing this volume, however, I must give an account of an adventure which he met with in London, and which will require a chapter by itself. It relates to the subject of swimming.

CHAPTER XIX.

SWIMMING.

WHILE Franklin was in London, he met with a somewhat singular adventure, that grew out of the disposition which he always manifested to learn every thing that he could, which there was any possibility might be of any advantage to him, and to communicate also any useful knowledge which he might thus acquire to others. The art which was the occasion of the adventure in this case was the art of swimming.

Almost all boys who have opportunities to go into deep water to bathe, when they are young, gradually learn to swim. Most boys, however, in acquiring the art of swimming, learn in an *empirical*, and not in a scientific manner. To learn empirically is to learn without observing or understanding any principles. A boy, in learning thus, flounders about in the stream without any plan or design, and without any definite idea of what it is necessary to do

How boys usually manage in learning to swim.

in order to swim. He lies down upon the water, and splashes with his hands and feet a moment, but he finds himself sinking, and feels the water coming into his mouth and nose, and then, after much scrambling and staggering, he gets his feet upon the bottom again, and stands up. This he considers taking one lesson. He never thinks of asking himself what the reason is why his mouth and nose go under the water, while those of another boy, a good swimmer, who is propelling himself smoothly through the water by his side, keep out. He never looks to see what the exact nature of the motion is which the swimmer makes with his hands and feet, so as to carry him forward, while he himself, with all his paddling and scrambling, only goes the quicker to the bottom. In a word, he pays no attention to principles at all, but acts blindly, trying again and again, but without any ideas of what he has to do, to guide him. Every thing is done by blundering, and finally he blunders upon the right; and so, in the course, of a few years, he becomes a swimmer, he knows not how. He can not be said really to have learned to swim. He has not *learned* any thing at all. He does not understand any thing. He can not even be said, strictly speaking, to *know how* to swim. He can do the thing, it is true, but he does not know, after all, *how* he does it.

Franklin learned in a very different way from this. When he saw a boy swimming through the water, he stopped to look at him, so as to understand exactly how and in what way the work was done. He reasoned, too, about the floating of the body, and about the mode by which the movement of the hands and of the feet could have taken effect in propelling it through the water. In working the feet, for example, many boys, when they first begin,

Franklin's mode of learning.

Advantage of it.

Wygate.

thrash them up and down, in and out of the water, making, of course, a great commotion, but producing no useful effect. Franklin saw very clearly, as every intelligent boy must do who reflects a moment on the subject, that to drive the body forward, the soles of the feet must be planted *against* the water, so to speak, and then driven backward, just as a child lying on the carpet would force himself forward upon it by planting his feet against the wall, or against any heavy piece of furniture, and then pushing steadily and square against it so as to move himself along. Having a distinct idea thus in your mind exactly what you are to do, and how the thing which you do is going to operate to accomplish your object, aids you very much in learning any art whatever.

Franklin learned to swim in this way, and of course, when he had learned, he could explain the process very easily and intelligently to any one else.

He acquired great skill in swimming, too, and could perform a great number and variety of feats of strength and dexterity in the water. He could dive to a great depth, and bring up stones from the bottom. He could float or swim on his back. He could go down feet foremost to the bottom of the river, and then, coming up suddenly, rise by half his length out of the water, like a sturgeon jumping. He had a book which contained an account of a great many performances of this kind, with descriptions of the manner of executing them. Franklin learned all these, and he invented, moreover, a great many new ones besides.

Among Franklin's friends in the printing-office was a young man named Wygate, who was a very intelligent and well-educated young man. This Wygate wished very much to learn to swim. He had

Franklin's two pupils.

The watermen on the Thames.

a friend, also, who had the same desire. So Franklin went with them into the water, and undertook to teach them. They were very intelligent pupils, and they listened very attentively to the theoretical explanations which Franklin gave them. Accordingly, when they lay forward in the water, and began to make an effort to swim, they knew precisely what it was that they had to do, and how they must attempt to do it. They did not, therefore, as many boys do in such cases, lose half their time in blind and aimless struggles. All the efforts which they made were made in the right way, and tended directly to the end which they had in view. The consequence was, that they learned so fast, that, after they had been taken twice into the river, they could begin to swim, and after that they needed no farther assistance.

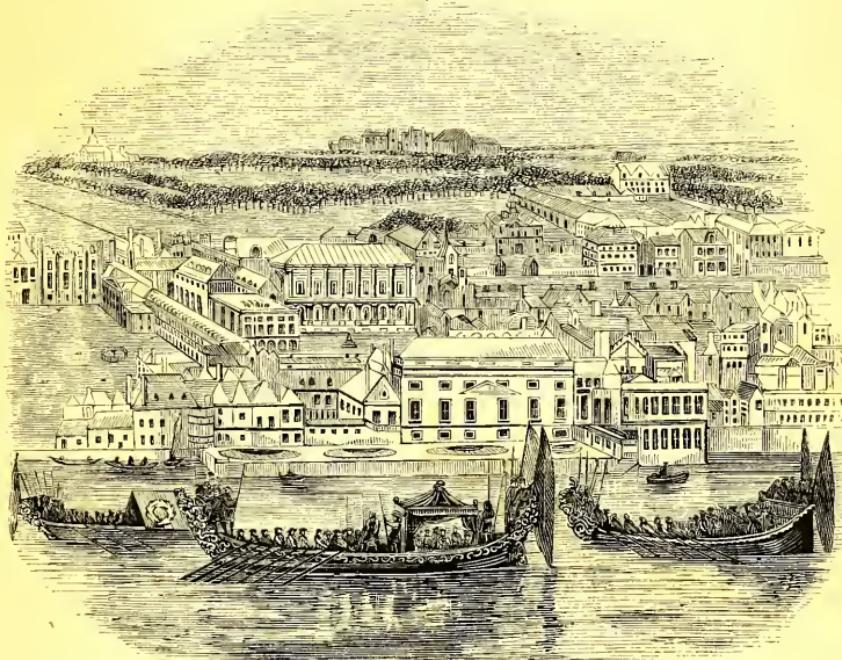
One day, while Franklin was residing in London, he went on an excursion up the river to a place called Chelsea, which is situated a few miles above the city. There were in those days a great many boats on the river, which were rowed by a class of men called watermen, and people often made excursions in these boats, both up and down the stream. There are many bridges across the Thames opposite to London. The watermen could row the boats through under the arches of these bridges, and they would proceed in this way until at length they got beyond the city. The banks of the river then began to be very picturesque and beautiful. There were green lawns extending down to the water's edge, and elegant villas on all the elevated points of land, and public edifices and pretty villages, and the spires of churches rising above the trees, and a thousand other objects of rural beauty.

In fact, so beautiful are the banks of the river, and so numerous

Picture of a procession of barges.

View of the river.

are the objects of interest that attract the attention of the spectator in sailing up or down, that aquatic excursions for pleasure have been very common on the Thames for many hundred years. On great public occasions, processions have been formed of boats and barges, the barges being sometimes very elegant in their construction and equipment. Here is an engraving of one of these



processions ascending the river, with the public buildings on the banks, as they existed some hundred years ago.

Franklin's party.His feats of swimming in the river.

There were several young men in the boat with Franklin at the time of his excursion. One of them was Wygate; and as the party were returning from their trip, coming down the river toward London, Wygate proposed that Franklin should show them some of his swimming feats.

The company in the boat warmly seconded Wygate's request, and Franklin accordingly acceded to it. He undressed himself, and plunged into the river. He then went swimming along down the river, keeping up with the boat as the oarsmen rowed it, and performing a great many feats of strength and dexterity by the way.

The party in the boat were very much pleased to witness these performances, and they applauded them very highly. Their applause stimulated Franklin's ambition to make still greater efforts, so that he very probably made a greater display of his aquatic skill than he had done on any other occasion. He kept in the water—accompanying the boat in this manner—all the way from Chelsea to Blackfriar's Bridge, which was the first bridge they came to in London. He then came up to the boat and climbed on board.

Not long after this occurrence, Franklin received a message from a gentleman of London, of high rank, requesting that Franklin would call at his house, as he wished to see him on some business. The name of this gentleman was Sir William Wyndham. Franklin did not know why he was sent for, but he went at the appointed time, and found that the gentleman wished to engage him to teach his sons to swim. He had heard in some way or other of Franklin's feats on the Thames on the day that the party went to Chelsea, and had also learned that Franklin had

Advantages of being able to swim.Effect upon the mind.

taught two of his companions to swim in two lessons ; so he wished to employ him to teach his sons. His sons were young men who were about setting out on their travels, and Sir William thought that it might be of great advantage to them to learn to swim.

It really is of great advantage to every one to learn to swim ; but this is not because cases often occur in which a person can actually save his life by swimming, or even rescue any other person from danger of drowning. Such emergencies as these are indeed very rare. Cases, however, do occur very often where the fear and anxiety which a person would otherwise suffer is very much diminished by knowing how to swim. A number of passengers, for example, in leaving a steam-boat or in going on board of one, may have to walk along a narrow plank, over deep water. Now if those who have to go over such a plank can swim, they go over it without fear. It is true it would be disagreeable to fall in, but they know that there would be no danger in it, and so they feel no trepidation or anxiety. They walk over the plank boldly, just as they would if it were a plank laid across a muddy piece of ground, whereas those who can not swim often come to the plank with a feeling of terror. The dark water below has an expression of awful danger in its gloomy depths, and perhaps some of them may actually fall into it from the influence of their trepidation and fear, when, if they had been able to swim, they might have passed over it in safety.

Thus persons who can swim are much more courageous than others in all cases where they have to pass over water, or where they are exposed to danger by water in any way. And although

Occasions requiring self-possession.Franklin declines Colonel Wyndham's offer.

on all great public thoroughfares, as, for example, in crossing the channel between England and France, and in going up and down the North River in America, arrangements are usually made which guard the passengers effectually from all occasion for this sort of alarm, still, in making extended tours, it is not possible always to avoid it. We have to descend from a great steamer to a small one sometimes, at the end of a voyage across the Atlantic, where we have only what seems to be a very steep and precarious footing to walk upon. We have to cross rivers in small boats, where bridges have been carried away, and even in taking walks in the country, I have seen young ladies of the city very reluctant to go over a brook upon a plank on which the children of the neighborhood would run to and fro without the least concern. In all such cases, knowing how to swim gives one a degree of courage and confidence that is scarcely to be acquired in any other way.

Franklin concluded not to accept Sir William Wyndham's proposal that he should teach his sons to swim, although he was offered a great price for the tuition, if he would undertake it. The proposal was not made to him until after he had concluded to return to America, and the young men were not then in town, and it was not certain how soon they would come. The price, however, which Sir William offered for the instruction of his sons was so great, that Franklin concluded that, if he were to open a swimming-school, and could have as many pupils as he could attend to, on the same terms with those which Colonel Wyndham offered, he could have a very profitable business, and he almost concluded to make the attempt. He could earn much more money in this way, he found, than he could by printing.

His wise reasoning on the subject.

His method of learning to swim.

His calculation was, no doubt, correct, so far as the immediate results were concerned ; but he would have made a great mistake, notwithstanding this, if he had attempted to carry this idea into execution. For the swimming-school, though it might be very profitable at the outset, could lead to nothing beyond, whereas the business of printing, though a journeyman's wages at that trade might at first be small, opens many broad and continued avenues to future usefulness. The field of enterprise in the work of printing and publishing newspapers and books is boundless. A man may rise to the very highest position of influence and responsibility by them ; whereas the swimming-school, however profitable it might be at the beginning, could lead to nothing great or noble in the end.

Young men should always look at the subject in this point of view when choosing their occupation for life.

Franklin continued to take an interest in the subject of swimming as long as he lived. Some years after the time of which we have been speaking, he wrote to one or two friends, giving them some instructions on the subject, and in these instructions he laid down, in quite a lucid manner, several of the more important principles which should guide a person in learning the art. He proposed a method for beginners which is very excellent, and which has been tried by many thousand boys since he recommended it, and will be tried by many thousands more in time to come. It was this :

When you are undressed, and are ready to go into the water, take an egg in your hand—a small white stone will answer just as well, and can be more easily obtained—and wade out with it until the water is up to your arm-pits, or as near to that depth as you

Difficulty of diving for the egg.

Keeping the eyes open under water.

think it safe to go. Then turn round so as to face toward the shore, and drop the egg or the stone, whichever it may be, into the water, a few feet before you. It will, of course, sink to the bottom. If it is an egg that you use in this experiment, it will sink rather slowly, but still it will sink, as an egg is somewhat heavier than water. If, now, you have waded out as far as is directed above before you drop the egg, you will see that you can not reach it as it lies on the bottom without plunging your whole body into the water, and diving for it, as it were. This you will find will be no easy task. Although you, perhaps, were afraid before even to lie down upon the water, for fear that you should immediately sink, you will now find that, instead of going to the bottom involuntarily, it is difficult for you to get to the bottom at all. You will have to paddle with your hands, and push the water back with them, in order to get down. You will see the egg lying there, but you can not get to it, and this will give you a more practical conviction of the natural buoyancy of the human body than can be obtained readily in any other way.

Of course you must keep your eyes open all the time, in order to see the egg. Some persons imagine that they can not keep their eyes open under water. But, if they will try the experiment boldly, they will find that there is no difficulty in it, and that no inconvenience results from it of any kind, whether the water be salt or fresh.

The lightest part of the human body is the chest, because that is the hollow part. It contains the lungs, and the lungs are filled with air. The lungs of animals, taken out and laid upon water, will float like so much froth. In fact, they are called the *lights*

Experiments in floating.

Specific gravity.

Illustrations.

on that very account. You make the lungs lighter by inflating them fully with air, that is, by drawing a long breath just before you lay yourself down in the water. There is a great difference in the specific gravity* of different human bodies, owing to the difference in the proportion of the bones to the other parts—bones being heavy. Notwithstanding this difference, however, the body of any person will float, especially in salt water, if the lungs are inflated, though few persons who do not know how to swim have courage enough to try the experiment.

The *way* to try the experiment, for those who have the requisite courage and self-possession, is this: Wade out into the river until the water is up to your chin. If you are afraid to go so far alone, let some one who can swim go with you. When you have taken your position, draw a long and full breath, and then, shutting your mouth, kneel or stoop down gradually, until your head is all submerged except the top of it, and then gently raise your feet off from the bottom. Of course you must hold your breath all the time, as your mouth and nose will be under water so that you can not breathe. But there is no difficulty in doing this except your want of courage and self-possession; for to go through the ex-

* Gravity means weight, but *specific gravity* means comparative weight in relation to other bodies of the same size. A ship, for example, is enormously heavy in itself, but compared with its own bulk of water it is *not* very heavy, and so it floats lightly; but a cannon ball, though weighing so much less absolutely than the ship, still weighs a great deal compared with its bulk of water. Its absolute gravity is less than that of the ship, but its *specific gravity*, that is, its weight in comparison with water, is much greater. So a duck will weigh a great deal more than an egg, and yet the duck swims lightly on the top of the water, but the egg sinks to the bottom. The specific gravity of the egg is the greatest.

Holding one's breath under water.

Another method of floating.

periment completely, so as to feel yourself sustained by the water, need not require more than five seconds, and a person may hold his breath fifteen or twenty seconds without any inconvenience. Most persons, however, who attempt to try this experiment for the first time, as soon as they find their mouth and nose sinking beneath the surface, will think they are drowning, and immediately begin to flounder and struggle, and so get back upon their feet again before they were fairly afloat.

There would be very little difficulty in performing this experiment if a person had his mouth at the top of his head, or if he had any other orifice for breathing there. He then would let himself down into the water slowly and gradually, until a sufficient portion of his body was submerged to float the rest, breathing all the time out of the top of his head. But as it is, when we attempt to let ourselves down in this way, the breathing openings are, of course, taken under water first, before the other parts are submerged, and this frightens us, and puts an end to the experiment.

There is another method, therefore, of coming to the same result, which is much more easy and much more satisfactory than the one I have already described, only it requires the aid of an assistant. The method is this :

Wade out into the water as before, and let your friend, who stands for this purpose by your side, put his hand against your back, and let you gradually down backward into the water, sustaining you, however, by his hand sufficiently to prevent your going altogether under. You might, perhaps, suppose that, if what I have been saying of the buoyant properties of the human body is true, there would be no danger of your going altogether under;

Momentum.

The laws of floating.

Precautions to be taken.

but there is danger, arising, not from the fact that your body is actually heavier than the water, but from the momentum which the body acquires in its motion when going down. If you take a long stick of wood, and, holding it perpendicularly over deep water, let it down until half the length of the stick is submerged, and then, finally, let go of it altogether, so as to allow it to descend rapidly by its own weight, it will go entirely under for a moment, though it will immediately rise again. It is carried under by its momentum.* In the same manner, a human body let down suddenly into the water would go entirely under, though if the lungs were full it would soon come up again.

It is to guard against this going down too suddenly that your assistant puts his hand under your back as you lie over. He must lower you down in a very gradual manner. You must throw your head back, too, as far as you can, so as to get as large a part of it as possible submerged. In fact, nothing should be left out of the water but your face, and as little of that as possible, except the nose and mouth.

This getting as much of the head under the water as you can is very important indeed, and, for the same reasons, the hands must be kept wholly under. Remember, in all your swimming experiments, that this is a universal rule, namely, that every portion of your body which is *under* water helps to buoy up the rest, while every part that is *above* the water helps to sink the rest. The not being aware of this principle is a reason for a great many of the failures which boys make in their first attempts to swim. They

* The *momentum* of any body in motion is that tendency which it has, when once moving, to *go on* until it is stopped.

Common errors.

Floating on one's back.

Difficulties.

keep their hands and arms, or their shoulders, out of the water, and this makes them sink immediately down ; or, when they are going to try to swim, they begin to paddle away very furiously with their hands before they have let themselves down *low enough*. A boy who lets himself down only to his shoulders, and who then, at the strokes which he makes, takes his hands out of the water partially or wholly, must of course sink ; for his head, and his shoulders, and his arms, while they are out, are only so many weights pressing him down. If he would get all these except his head under water, and keep them there, they would then become so many floats to buoy him up.

But to return to our experiment. When your friend has let you down so as to get all the back part of your head submerged, taking care, at the same time, that your hands and feet are entirely under, he directs you to draw a long and full breath, and then gently drops his hand from beneath you. You will find that you will float quite securely on the water when left thus wholly to yourself. You can then soon breathe a little ; and though, at every *expiration*, you will observe a tendency to sink, at every *inspiration* there will be a tendency to rise again, and thus you can float a considerable time.

In fact, you could float so far an indefinite period were it not for two difficulties. One is, that your feet and legs, being parts of the body that are heavier than water, will be all the time slowly sinking, and thus, in a short time, your chin, and next your mouth and nose, would be drawn under. This will frighten you, and you will immediately begin to struggle to recover your footing. The other difficulty is, that you might possibly begin to

Necessity of understanding what you are doing.Movement of the feet and hands.

turn over in the water, which would also set you to struggling. A swimmer can counteract this tendency by a slight motion of his hands, but one who does not know how to swim can not very easily effect this.

Experiments of this kind, which give you practical ideas of the degree of buoyancy which the human body possesses, and of the actual conditions on which your own will float, are extremely useful to those who are learning to swim.

Above all, it is necessary, in order to make sure and rapid progress in acquiring this art, to keep in mind, in all the efforts that you make, what the object is which you have in view, and how the effort that you are making tends to accomplish the object. In working your feet, think continually, when you are making the stroke, that your object is to push yourself forward by *pushing the water back*, and plant your feet accordingly in such a manner, before you give the stroke, as to push back as much of the water as possible. Striking your feet up and down, in and out of the water, as many boys do who practice without thought, will of course do no good.

On the same principle, the hands must be worked in such a manner, when you are attempting to swim, as to *push the water back* with them, as if you were trying to get as much of it as possible behind you. It is the reaction of this pushing of the water back that drives the swimmer forward. Now, in order to push the water back, the hands must be held in such a position as to turn the palms outward and backward. They must also be inclined a little downward, so as to exert a part of their force in buoying the body up, and thus help to keep the head above water. The

Advantage enjoyed by the dog.

Swimming with a load on one's back.

position of the hands is somewhat difficult to manage exactly, being quite an unnatural one.

The dog has a great advantage over man in respect to this point, for the most natural and easy motion of his paws that he can make is the very one best adapted both to buoy him up and to propel him through the water. 'The natural motion of his paws is especially adapted



to buoy him up, and it is in consequence of this, in part, that he swims with his head far higher out of the water than man. He can even carry articles of weight in his mouth, and hold them high up from the water as he swims

along. A man or a boy, on the other hand, would find it very hard to swim with a cane in his mouth.

And yet sometimes persons can swim with quite a considerable burden on their heads. I have heard of a boy swimming across a river with his clothes tied in a bundle on the top of his hat. To do this, however, requires a great deal of strength and skill.

Franklin receives a very advantageous offer from Mr. Denham.

CHAPTER XX.

THE RETURN TO AMERICA.

VERY soon after the incidents took place which are related in the last chapter, Franklin left London and returned to America. The reason why he returned at this time was because his friend, Mr. Denham, was going back, and he received a very advantageous proposition from him to go into business with him as a merchant.

Mr. Denham was going to open a store in Philadelphia. He was intending to purchase his goods in London, and to send them over in the ship. He would require a clerk, he said, to aid him in his business. The duties of the clerk would be, to keep the books of accounts, copy the letters, and attend in the store to sell goods to the customers when they came in.

Mr. Denham told Franklin that he would give him two hundred and fifty dollars a year if he would be his clerk.

One objection to this plan was, that Franklin did not understand book-keeping very well ; but Mr. Denham said that he would instruct him in what he was to do, and that he would soon learn.

Nor was he acquainted with the kind of goods which Mr. Denham was going to buy, or with the art of explaining the qualities and prices of them to customers, so as to induce them to purchase. This is, in itself, quite an art. It is an art which some persons seem to be wholly unable to acquire. Mr. Denham, however, was persuaded that Franklin would learn it very soon. He was so intelligent, and so gentlemanly in his manners, and there was such an

Mr. Denham forms various plans.

Franklin's salary.

air of frankness and honesty in all that he did and said, that Mr. Denham was quite sure that he would succeed.

The salary which Mr. Denham offered him—two hundred and fifty dollars a year—was less than he received in the printing-office, and this was one reason which led him to hesitate about accepting Mr. Denham's proposals. But Mr. Denham said that, though he proposed to pay him only two hundred and fifty dollars at first, while he was a clerk, he would soon make a much more advantageous arrangement with him, in case he was diligent and attentive to his business, and succeeded in it. He would send him to the West Indies, he said, with a cargo of flour and bread, and procure other business for him to do there, on commission, which would be very profitable to him.

There was a great deal of that sort of trade between Philadelphia and the West Indies in those days, as, in fact, there is now. Wheat and other such grains, used for making bread, do not grow in hot climates, and, consequently, all the supplies which the people who live within the tropics obtain of these grains, or of the flour or biscuit made from them, go from the cooler regions of the north. The Philadelphia merchants were accordingly accustomed to send cargoes of breadstuffs to these islands, and bring back coffee, and sugar, and oranges, and other tropical productions in return.

Mr. Denham therefore promised Franklin that, if he was successful in the performance of his duties as a clerk, he would, in the following year, send him to the West Indies in charge of such a cargo as this, on commission. This means that he was not to have a regular salary for his services in selling the flour and the bread, but a certain proportion of the amount received for what he

Qualifications of a good salesman.

The offer accepted.

should sell, and of that disbursed for what he should buy. Such a business as this is very profitable, provided a man can have enough of it intrusted to his charge to employ him fully. He may sometimes double his own pay by an increase of his business, without adding any thing of consequence to his trouble. For example, suppose that he has an order to purchase a hundred hogsheads of sugar for a certain merchant, and the commission upon the purchase amounts to fifty dollars ; if, now, any other merchant will give him an order to purchase another hundred hogsheads, he can earn an additional fifty dollars very easily indeed, for while he is on the spot, and engaged in attending to the business, he can purchase two hundred hogsheads of sugar almost as readily as he can one.

But a man must be very capable, efficient, and prompt in his mode of doing business, in order to get enough of this sort of business to do to make it profitable to him. To do a small business on commission is very unsatisfactory to all concerned.

Franklin felt confident that he could succeed in satisfying those merchants who should intrust their purchases and sales to his care, and so he finally concluded to accept Mr. Denham's proposal. The agreement was consequently made. Franklin closed his engagement at the printing-office, entered into the service of Mr. Denham, and was thenceforward employed every day, for some time, in going about the warehouses in London with his new employer, to examine and select goods for the purpose of making up the necessary assortment to take to America.

When the assortment was made up, the goods were packed and put on board the ship, and soon afterward Franklin set sail for

Franklin returns to Philadelphia.Mr. Denham opens his store.

America. He landed safely in Philadelphia, after a pleasant and prosperous voyage.

Mr. Denham immediately took a store, and, opening his boxes and bales, he put the goods upon the shelves with Franklin's assistance, and then set Franklin to selling them. When there were no customers in the store, Franklin would employ himself at the desk in the counting-room, copying letters or keeping the accounts.

Franklin took great interest in the duties of his new occupation, and was very successful in discharging them. He liked the employment and he liked his employer. Mr. Denham was very kind to him, aiding him in various ways, and giving him, from time to time, all the counsel and assistance that he needed, in the most friendly manner, just as a father would have done, under similar circumstances, for a son.

Things went on in this way very pleasantly and prosperously for six months. It was in August when Mr. Denham arrived in Philadelphia and opened his store. In January Franklin became of age. His twenty-first birth-day came on the seventeenth of that month, and here, therefore, properly ends that portion of the great philosopher's life which is the subject of the present volume. It may, however, not be out of place to say, that immediately after Franklin became of age, both he and Mr. Denham were taken sick. His own sickness was very painful and severe. He endured a great deal of suffering, and was brought at last into a situation of great danger. At length, however, the crisis came, and terminated favorably. He began slowly to recover. But, as his strength revived, and the prospect began to appear encouraging that he might get well, he learned, to his great sorrow, that his ex-

Death of Mr. Denham.

Governor Keith.

Franklin meets him.

cellent friend and benefactor was gradually declining, and that it was probable that he would die. In the end, these fears were realized. Mr. Denham died, the business of the store was wound up by the administrators, and Franklin's hopes of becoming a great merchant were suddenly brought to an end.

He, however, was not particularly depressed by this change in his prospects. He immediately began to form new plans, and to proceed with great promptness and energy to the execution of them. What these plans were, and how he succeeded in meeting and overcoming the difficulties which he had to encounter in entering the world as a man, will be made the subject, perhaps, of some future volume of this series.

In respect to Governor Keith, the pretended patron who had practiced so cruel a deception upon our hero in relation to the letters of introduction, Franklin met him one day in the street, after his return from England. Sir William's term of service as governor had expired, and he was now a mere private citizen. He looked a little confused and ashamed when he saw Franklin coming, but he passed him without speaking to him. Franklin was very willing to allow him to pass, as he did not desire to have anything more to do with such a man.

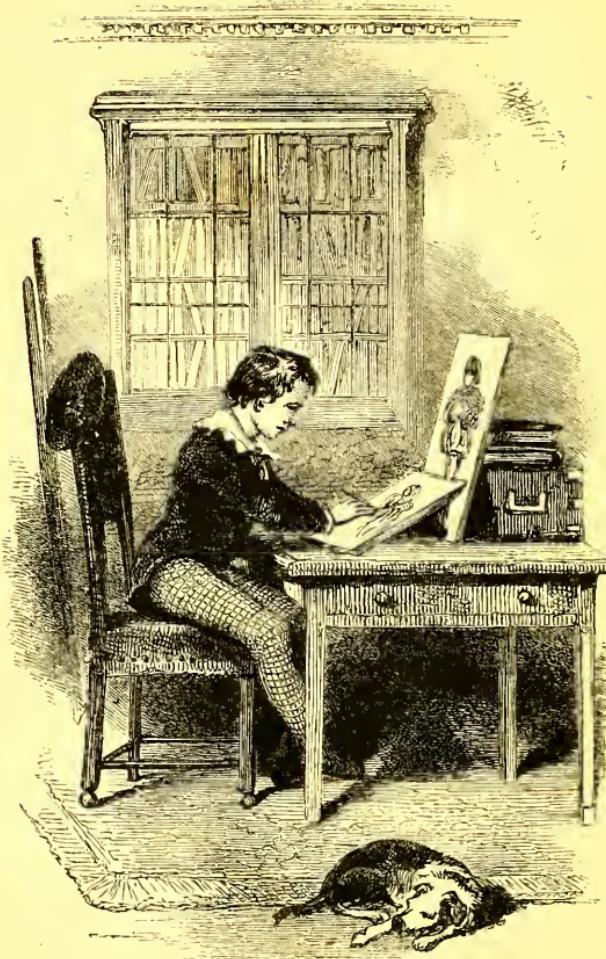
There are a great many very useful lessons to be learned from reading the history of the boyhood of Franklin. His industry, his forethought, his enterprise, his courage, and the steady and determined energy with which he prosecuted the plans that he formed, are worthy of all imitation. There is one other point besides in which all young persons should follow his example, and that is in the interest which he took at all times in acquiring

Example of Franklin.

Conclusion.

knowledge. During the whole period of his boyhood and youth, he spent his leisure time, not in idle sports or frivolous amusements, but in learning something which might be useful to him in future years, and it was to this trait in his character, in no inconsiderable degree, that his subsequent greatness was owing.

THE END.



LEARNING TO DRAW.

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P R E F A C E.

BEFORE you begin to read this book, procure a piece of white paper, not ruled, of the size of one of these pages, and also a lead-pencil, with a fine point, or, if convenient, a pen and ink. Take your place, too, in reading it, near a table or a desk, so that you can have a convenient opportunity to draw a little, from time to time, as you may have occasion, in reading the book. You will find, as you go on with the reading of it, that various little experiments are suggested to you in the several lessons, and the advantage which you will derive from the perusal of these instructions will be more than doubled by your having at hand the means of putting into practice at once what you learn. By the time that you have finished the book, your paper will be covered with little drawings, and you will find that, in making them, you have impressed upon your mind very strongly the ideas and principles which the book is intended to illustrate and explain.

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T H E S T U D I O.

STUDY I.

LEARNING TO DRAW.

Some account of the frontispiece.

Arrangements made by the boy.

IN the frontispiece is a picture of a boy learning to draw. He is seated at a table. He has placed his model up before him in a convenient position. He has contrived to support it in this position by means of a portable desk, which he has placed upon the table, on the back side of it. The desk was not quite high enough, and so he placed two books upon it, to aid in supporting his model.

The boy is performing his work very carefully. His subject is the figure of a man. The man seems to be a Scotch Highlander. The human figure is a very difficult subject to draw.

The boy has placed his cap on the back of a chair. The dog lies asleep on the floor in the foreground. In the background is a book-case well filled with books.

The boy is teaching himself to draw. He has no instructor. Any boy or girl can learn to draw by themselves, or, at least, they can make great improvement in the art, and lay such a foundation as shall enable them, when they have a teacher, to advance to higher attainments with great rapidity.

Of drawing materials.Working at advantage.

The materials really necessary for practicing drawing are very few, and very easily obtained. For practice, almost any kind of pencil will do, and any kind of paper. The great thing to be done first is to study the form of your model, and to represent that form correctly in your own drawing. For this purpose, any sort of paper that will take a trace, or any sort of pencil that will make one, will answer the purpose.

After making some progress in studying the forms of objects, and in acquiring skill in delineating them, it is certainly much more convenient and much more agreeable to have good drawing-paper, and good drawing-pencils, than those of an ordinary or inferior kind, but it is not at all essential. You can, in fact, learn a great deal, without any pencil at all, by practicing with pen and ink.

There is one thing, however, which is of great importance to enable you to accomplish any thing successfully in attempting to draw, and that is, that you should take *the right position* in doing your work. It is a great deal better to sit at a desk or a table, than to hold your slate or your paper in your lap, as children often do. In this latter case your position is constrained, and the fatigue and awkwardness of holding your materials in one hand while you draw with the other—your feet perched up, perhaps, all the time upon the rounds of the chair, as seen in the opposite engraving—will effectually prevent your doing any thing well. A good position is indispensable, if you wish to work to advantage.

Some children think that they can not learn to draw because they have no proper models, or patterns, as they are sometimes called. But this is a great mistake. Every picture-book that

Picture of a boy working at a disadvantage.



WORKING AT A DISADVANTAGE.

you open will furnish you with models. The engravings in your books are drawn on blocks of wood in the first instance—many of them by the best artists—and are afterward engraved just as they are drawn. The printed impressions, therefore, in the books will furnish you with excellent models both to copy and to study.

What I mean by studying a model is examining it with atten-

The handle and the hinges.

Mode of studying an engraving.

tion and care, in order to see in what manner the strokes are made, so as to produce the required effect, with a view to imitating it. For example, look in the engraving at the frontispiece, and see how the end of the desk, with the handle and the hinges upon it, are drawn. The wood of the desk is represented by perpendicular lines, drawn closely together, while the handle and the hinges are shown simply by leaving spaces of the proper form, white. Look very closely at the lines, and note carefully the breadth of the strokes, and the distance between them, and, as you are looking at this shading, imagine that you are endeavoring to imitate it with pen and ink, and consider exactly what you would do in such a case. Examining a drawing in this way is called studying it, and such an exercise is of very great importance to those who are learning to draw.

It is an excellent plan to select small parts of pictures like this, and then, after studying carefully the mode of execution in the engraving, to imitate it as closely as possible with a pencil, or a pen and ink. The end of the table which is turned toward us, in the frontispiece, would be an excellent subject for such a lesson. Observe first, closely, how the work has been executed by the artist in the engraving. See how he has represented the edge itself of the table, by short perpendicular strokes placed very close together. See also how the artist has made the edge appear to *project*, by simply drawing a shadow under it. Observe, too, with what sort of touches the knobs for the drawer are finished, and how they are made to appear to project by means of their shadows. Note the forms of these shadows, and the directions in which they are thrown, and the horizontal line beneath the knobs, denoting

Many good lessons in one picture.

The dog on the carpet.

the bottom of the drawer. After having thus studied every part of the work very carefully, take a pencil or a pen, and attempt to imitate it as closely as you can, drawing the end of the table only, and omitting all the rest of the design.

After you have finished the end of the table, however, you can, if you choose, attempt to draw the desk, and the pictures upon it. This, however, will be more difficult, for the artist has very adroitly contrived to represent the white paper by drawing shadows on the wall behind, and then leaving a part of the paper white, of the right form to represent the model and the drawing-book. This is very difficult to do. Still, those who have had some practice in drawing may undertake it successfully, in such a case as this.

The corner of the carpet in front of the boy's chair would make another good subject for study and imitation.

So would the dog lying on the floor in the foreground, though, to succeed in drawing the dog, the pupil must be considerably advanced in art.

STUDY II.

THE SAIL-BOAT.

HERE is a party in a sail-boat. They are sailing along the shore of the sea, near a sandy beach. The wind is blowing toward the shore. This we see by the position of the sails. They swing off toward the shore. But, though the boat is impelled solely by the wind, it is not driven to the shore, but draws off from it, *into the wind*, as the sailors say. This is very extraordinary.

The philosophy of sailing.

The mainsail.

The jib.

The sprit.

It is owing to the manner in which the sails are set, and also to the action of the keel. The keel is a long and narrow projection extending from stem to stern underneath the boat. It tends to prevent the boat from drifting sideways, and thus guides it in its motion through the water, making a groove, as it were, in the water, for itself to slide in.

The sails being set as they are, the wind, blowing from the sea to the shore, strikes them obliquely, and is reflected from them, as it were, in such a manner as to drive the boat forward the way she is headed. The helmsman, seated in the stern of the boat, keeps her head right by means of the rudder. We can see the rudder distinctly at the stern. The handle of the rudder, by means of which the gentleman who is steering controls it, is called the *tiller*. We can see the tiller in the picture, though not distinctly.

This sail-boat is sloop rigged. She has a mainsail and a jib. The large sail is the mainsail. The small, three-cornered one at the bows is called the jib.

The mainsail is kept extended by the pole which passes up diagonally to the upper corner of it from the mast below. This pole is called the *sprit*, and a sail made to be extended in this way is called a spritsail.

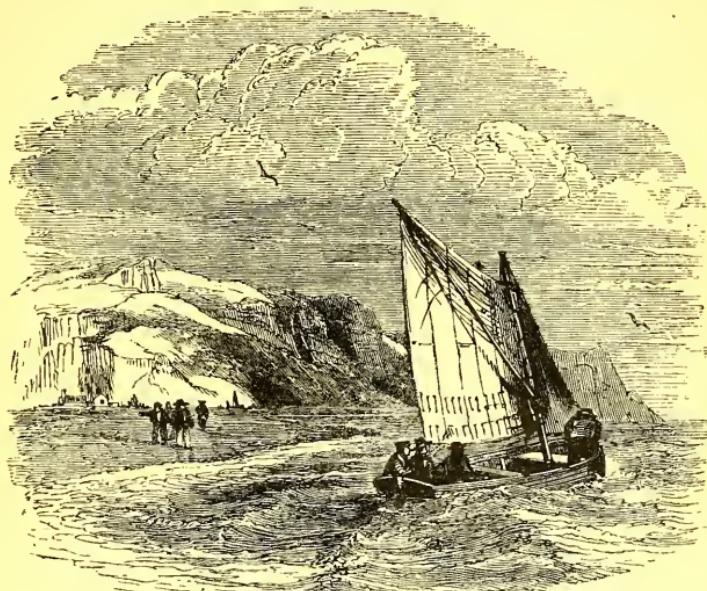
There are three gentlemen in this boat and one sailor. The gentlemen are seated in the stern. The proper place for the officers in a ship, and for gentlemen or visitors, in a boat, is at the stern. That is the place of honor. The seaman is forward. He is there so as to keep a look-out ahead, and also to do what may be required about the sails.

Return of the sail-boat.

Group on the beach.

The sailor.

The proper place for a seaman on board a vessel or a boat is forward. That is the place of service.



THE SAIL-BOAT.

Several persons are standing together on the beach looking at the sail-boat. One of them has his arm extended. This one is evidently a sailor. We know by his dress. The figure is small, but it is very evident that the man is a sailor. It requires great skill in the artist to give so much character to so small a figure. It would be a good lesson in drawing to attempt to imitate this figure, precisely, with pen and ink.

An important principle of perspective explained.

To the right of this group is a person alone. He is far back from the rest, and appears to be coming forward.

Examine this figure carefully, and see if you can discover by what means the artist has made him appear to be so much farther back than the rest.

His having this appearance depends on two circumstances. One is, he is smaller than the others. The other is, that his feet are higher up, in the view. His feet are nearly in a line with the hands of the other men as they hang down by their sides. Both these things are necessary to give the figure the effect of being at a greater distance than the others.

If this figure had been made as tall as the other men, while his feet remained where they are, he would have looked like a giant.

If he had been made as small as he is, and his feet had been on a line with those of the other men, then he would have looked like a boy standing near them.

As it is, he looks like a man far behind.

If the artist had desired to represent a man still farther back, he would have made the figure smaller still, and would have placed the feet yet higher in the field of view.

In the distance, on the borders of a creek which puts up there from the sea, is a small town. Beyond is a high hill. The hill terminates seaward in a bluff, which we see in the distance almost in the range of the bows of the vessel.

Sea-gulls are flying in the air.

The bathing place.

Principle of perspective.

Illustrations of it.

STUDY III.

BOYS BATHING.

IT is a warm summer's day, and the boys are bathing. They have a safe place to bathe, for the water is not very deep. One of the boys is standing on the bottom, in the middle of the stream.

The principle of perspective which was explained in the last study, namely, that objects that are meant to be represented at a distance are drawn smaller, and placed higher up in the field of view, than similar objects that are near, is illustrated in this picture. For example, the boy lying on the bank, in the foreground, is meant to be represented as quite near to us, and the lower part of the outline of his figure is in a line with the very lowest edge of the picture. The two boys in the middle of the water are farther *up* in the picture, and they are also drawn smaller. This we can see by their heads ; the heads of the boys in the water being smaller than that of the boy on the land.

Farther back is another boy, whose head is just visible above the water. This head is smaller still, and it is drawn, too, at a point higher up in the field of view.

The boy sitting on the bank beyond, being even more distant, is higher up still, and his head is yet smaller.

Thus the rule is universal ; when objects are viewed at different distances in any scene that we look *down upon*, those that are more remote will always appear smaller in size, and higher up in place, than those which are near.

Four boys in the water.

Directions for swimming.



LEARNING TO SWIM.

There are four boys in the water. The one who is nearest the boy who is standing up is going to try to swim; but he must let himself down much lower than that into the water if he wishes to succeed. A boy can never swim with his head and shoulders so high out of the water.

In fact, when a boy is learning to swim, a very essential thing is that he should let himself down into the water as low as possible before he begins his paddling. He should let himself down until the water reaches his under lip, so as to have as much of his body submerged as possible, without carrying his mouth and nose under. The reason of this is, that every part of his body which is above the water tends to weigh him down, while every part which is under the water tends to buoy him up.

Conversation between George and the boy on the bank.

The third boy in the picture is right. His body is wholly submerged. We see nothing of him but his head, and the line of his shoulders very near the surface of the water.

The fourth boy has found a place where the water seems to be pretty deep. It is a dark and gloomy-looking place where he is going, near a high fence. This fence incloses, I suppose, some gentleman's garden.

There are willow-trees on the banks of this stream. There are two on the right-hand side, and one on the left. A group of boys are sitting and standing under the left-hand willow. Three are sitting, the other two are standing. Two of these boys are dressed. They have finished their bathing, and are ready to go home. The other three have not yet finished their dressing. One of them is standing with his back toward us. He is looking at the boy who is wading into the deep place in the water, and calling to him.

"George!" says he, calling out aloud.

"Ay, ay!" answers George.

"How deep is it there?"

"Not very deep. It is not above my shoulders yet."

"What sort of a bottom?"

"Hard sand."

"Any sharp stones on the bottom?"

"No; it is smooth, hard sand."

After a little pause, the boy on the bank calls out again,

"I've a great mind to come there."

"Yes, come!" says George. "Come! do!"

"I would," replies the other boy, "if I had not come out, and got partly dressed."

A small drawing lesson.

Importance of shadows.

"Oh, that's no matter. Come!"

The boy concludes, however, not to go, though he resolves to explore that region thoroughly the next time he bathes.

This boy, as he stands on the bank, would make a very good subject for a drawing lesson. His figure is represented by very few lines, and those are of such a character as may be very easily imitated by the pen. Examine very attentively the fine shading, and see by what sort of touches the effect is produced. With a fine pen, this kind of shading may be very exactly imitated.*

After drawing this figure, you may, if you please, draw the water behind it, with a portion of the fence, and the head of the boy who is wading; though to do this well will be quite difficult, and perhaps you had better be content with drawing only the figure.

In drawing with a pencil, the paper must be on something quite hard, as on a board or a smooth table. The cover of a book is not usually hard enough. The pencil produces an indentation in the paper unless the paper is laid on something quite hard. In drawing with the pen, this is not necessary, as the pen does not tend to indent the paper. In copying models from engraved subjects, such as those in this book, it is, perhaps, better to use a pen, as a more exact imitation of the model can be made with ink than with lead.

One thing, however, as has already been said, is very essential to success in these experiments, and that is a right posture, and a

* Observe the shadow of the feet on the ground, and do not omit that, if you attempt to make a drawing of this figure. It is a very important part, and must be shaded carefully, as in the engraving, with a fine pen.

A good posture very necessary.Story of Susan and Minna.

chair and table of the right relative height. If the paper upon which you are drawing is up on the top of a thick book, or on a cushion in your lap, or if the table is too high or too low, so that your arm, in resting upon it, has to be held in a constrained position, you can not work to advantage, and, of course, can not do any thing well. Remember, however, that it is the *relative*, and not the *absolute*, height of the table that is to be considered. No matter how high it is, if you put something in the chair to raise your seat, so as to bring your arm right on your paper.

STUDY IV.

THE FISHING-POLES.

A GIRL named Susan lived in a cottage. She had a little sister four years old.

“Susan,” said her mother one day, “you may take Minna this morning and go and take a walk.”

So Susan took Minna and went to take a walk. Minna wondered at every thing she saw.

Presently the two children came to a bridge which led across a brook. Below the bridge were some boys standing on the sand fishing. Minna wished to stop and see what they were doing.

So Susan stopped and leaned upon the railing of the bridge. Susan was tall, and she could look over the railing. Minna, however, was so small that she looked under it.

“What are they doing?” asked Minna.

“They are fishing,” replied Susan.

The boys' fishing-poles.

Endogenous and exogenous plants.

"Let me go down there and see," said Minna.

"Oh no," said Susan. "It is wet and muddy along the shores. We must stay here upon the bridge."

The boys have very long and straight poles. They are cane poles. The reed or cane grows in warm climates. It is a very tall and slender plant, and, being hollow, it is very light. It is what is called an *endogenous* plant. There is one grand division made in the classification of plants, relating to the manner of their growth. Some plants grow by a succession of fresh layers on the outside of their stems, one layer every year. These plants are called *exogenous*, which means *outside growing*. These trees all have a bark. The use of the bark is to protect the new layer of wood while it is tender and soft.

The plants and trees which are called *endogenous* do not grow by outside accretions, but by a general expansion of their whole substance within. These plants have no bark. Endogenous means *inside growing*.

Indian corn is an example of an endogenous plant. It grows by a gradual expansion of its whole substance. If you cut across a stem of Indian corn, you will not find any concentric layers, as in the stems of trees, but only a sort of radiation in the texture of the pith, with lines running from the centre toward the circumference.

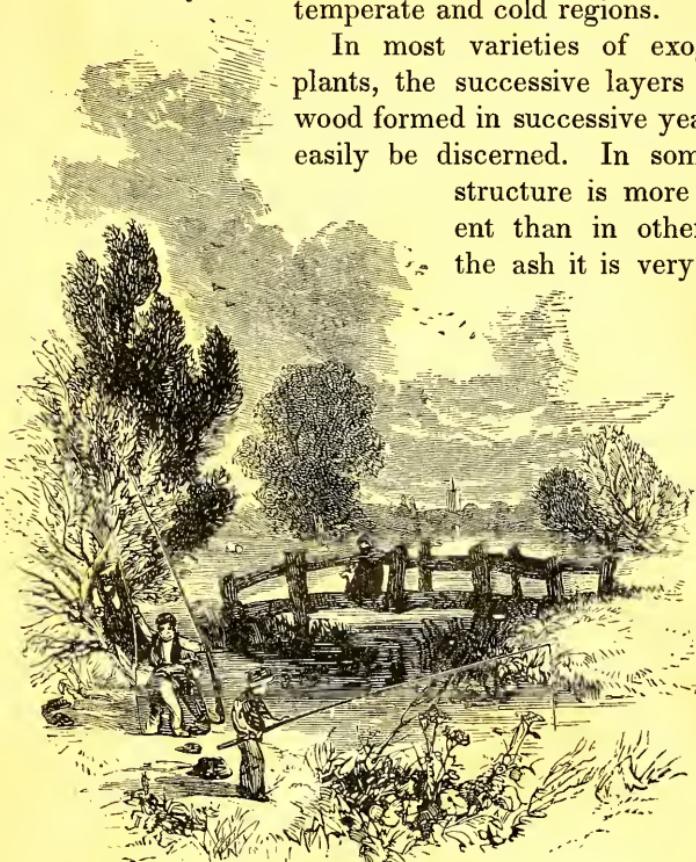
Indian corn has no bark. The outside surface is smooth, and hard, and polished.

The ratan is another endogenous plant. The sugar-cane is another. The palm-tree is another. Finally, the reed which is used for fishing-poles is another. None of these plants have any bark, or any successive layers in the structure of the wood.

Picture of Minna and Susan on the bridge.

Endogenous plants grow more commonly in warm climates, especially in the tropics. Exogenous plants, on the other hand, prevail in temperate and cold regions.

In most varieties of exogenous plants, the successive layers of the wood formed in successive years can easily be discerned. In some, this structure is more apparent than in others. In the ash it is very appar-



SUSAN AND MINNA.

Directions for making a collection of "woods."

ent indeed. But in the stems of almost any of the young trees or bushes that you find in the woods, if you cut them across, you can easily see these successive layers. If you count the layers, you can tell how many years the tree or bush has been growing.

You may easily make a very pretty collection of the different kinds of wood in this way. Select round sticks of the different kinds, all about two inches in diameter, or of any other diameter that you find more convenient, and saw off sections of them about an inch long. Then, with a chisel or a sharp knife, cut the sawed surfaces smooth. Then put them into a cool place to dry. If you put them into a warm place, they will dry too fast, and the ends will crack. A good way is to put them in a box and cover them with shavings. The shavings will hold the moisture and not let it escape too fast. It will escape slowly, however, so that the wood will dry in time, and it will not crack.

When the specimens are entirely dry, rub the smooth ends with sandpaper, so as to make them perfectly smooth, and then varnish them, both around the sides and on the ends. This will bring out the colors of the bark and of the wood, and show more plainly the layers of the grain.

In the course of a year or two you can get a large number of specimens from the woods near where you live, only taking care not to cut down any valuable young trees to procure them.

If you live at the North, you can ask some friend who is going to the South, or to the East Indies, to bring you home a short piece of the stem of the sugar-cane, or of the mahogany-tree, or the ebony-tree, or the rosewood-tree, or any other specimen that would make a peculiarly valuable addition to your collection.

A principle of perspective farther explained.

STUDY V.

A PRINCIPLE OF PERSPECTIVE.

OBJECTS seen at a distance appear smaller than when they are near. This principle has already been stated, and in some degree explained, in the previous Studies. I introduce it again here for the purpose of showing you a curious consequence which flows from it, in respect to the apparent direction of certain lines, when seen in reality or in a picture—lines, namely, which recede directly from the spectator.

From this principle, then, that an object, when distant, appears smaller than when near, it follows that any parallel lines seen in the picture—such as those which form the two sides of a room, or of a street, or of a bridge—that recede from the place where the spectator stands, will appear to converge, that is, to come together.

Attend closely to the reasoning in this case. I say it *follows*, from the fact that objects at a distance seem smaller than those which are near, that lines directly receding from the eye will appear to converge.

How does this follow?

Thus :

On the following page we have a view of a long rail-road bridge, with the rail-road traversing it. The iron rails rest upon wooden cross-pieces called *ties*. These ties are imbedded in the ground, and support the rails.

The rail-way bridge.

A principle of perspective.

Reasoning.



PERSPECTIVE.

the spectator. This is seen very clearly in the above engraving.

It is the same with the sides of the bridge. The plank which is at the farther end, being more distant, must appear shorter than the one at this end. This will bring the sides of the bridge nearer together at the farther end.

This reasoning will apply also to the railing of the bridge. The top of the railing will seem much nearer to the floor of the bridge at the farther end than at this one, because the posts which support the railing will appear much shorter at that distance.

We see that it is so in the engraving. The edges of the bridge, the railing of it, and the rails of the road, all appear to converge as they recede, so that, although, in the foreground, they are very wide apart, in the distance they almost come together. If the lines had been continued a little farther, they would have come

Now, since objects appear smaller at a distance than when near, it follows that the tie which is at the farther end of the bridge must seem shorter than the one which is at this end of it, and as the ties represent the distance of the rails apart, it follows that where the ties appear shorter, the rails must appear to be nearer together. Thus the rails seem to converge as they recede from

Another application of the principle.

A view.

together in a point not far from the middle of the funnel of the locomotive which is just coming into view.

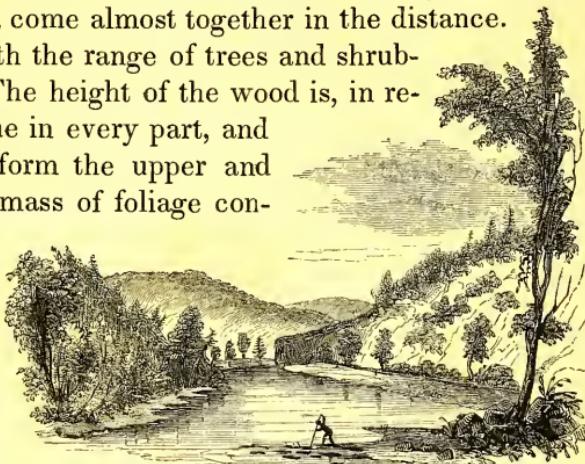
This engraving represents a view on the Erie Rail-road.

The same principle applies substantially to irregular lines that appear in landscapes, as well as those which are regular. Thus the shores of a stream, and the upper and lower lines of a mass of foliage, or of a range of hills, will appear to converge as they recede. You can see this very distinctly in the following landscape. The shores of the stream, which are very wide apart near the foreground, come almost together in the distance.

It is the same with the range of trees and shrubbery on the left. The height of the wood is, in reality, much the same in every part, and yet the lines that form the upper and lower edges of the mass of foliage converge—the one descending, and the other ascending.

It is the same with the high bank or ridge on the right side of the river. The upper line descends, while the lower one ascends. The hills in the distance, which pass *across* the field of view, are not subject to this law. The principle applies only to lines receding from the spectator—that is, lines passing from front to back in the view.

Observe the man standing on the log in the foreground of this



CONVERGING LINES IN LANDSCAPE.

Sailing on a log.

Differences between drawing and engraving.

picture. It requires a considerable degree of dexterity to stand in this way upon a single log, afloat in the water, and to keep it from rolling under one's feet; but the mill men and lumber men, who are accustomed to it, do it without difficulty. The man has a pole in his hand, with an iron pike in the end of it. With this pike-pole he is endeavoring to seize and secure the other logs that are floating around him. He intends to bring them all in toward the shore. Examine carefully the form of this man, as the artist has drawn him, and the kind of strokes and touches by which he has represented the logs, and the ripples in the water. This group can be very well copied with the pen, or, by enlarging it to four or five times its present size, with the pencil.

Look, now, once more at the picture of the rail-road bridge. You will observe that the railing is represented by white lines on a dark ground. This kind of effect is very easily produced in an engraving, though it is very difficult to do it with a pencil or a pen. To do it with a pencil or a pen, you would be obliged to draw carefully all the dark shades, and *leave* the white lines. To do this accurately would be extremely difficult. In engraving, the artist can produce white lines in this way, on a dark ground, very easily indeed, but it is only black lines on a white ground which can easily be copied with ordinary drawing materials.

This subject will be more fully illustrated in the next engraving.

Description of the manner in which designs are made on wood.

STUDY VI.

WHITE UPON BLACK.

In this engraving is another example of the effect produced by white lines relieved upon a dark background, in the upper edges of the boards of the fence. The effect is spirited and beautiful. The light striking thus on those lines, brightens up the picture very much. Such lines, as we have already said, are made quite easily in an engraving, but it is



THE FENCE.

very difficult to make them in a drawing. In order to show why this is so, I must explain how these engravings are made.

The design is first drawn by the artist on the end of a flat block of wood, made perfectly smooth for the purpose. The surface of the block is whitened, too, before the designer begins his work, so that he can draw upon it easily. When the drawing is made, then the engraver takes the block, and with a magnifying glass before his eye, and certain very peculiar tools in his hands, he proceeds to cut out all the parts of the block which were left white, and leaves all those parts which the pencil has touched. Thus every dot and line is left, and all the spaces between the dots and lines are cut away. This is an exceedingly nice opera-

The manner in which white lines are made in an engraving.

tion; as you may easily perceive by looking at the lines which represent the clouds in the foregoing engraving. Observe how fine they are, and how close together. The white spaces between them are exceedingly fine, the lines being very close together. And yet all these spaces have to be cut out of the wood, and the lines left.

So with all the white spaces in the foliage of the trees, and in the shading of the field between the two fences. The water, being nearly all white, is cut out almost altogether.

When the block is thus engraved, it is put upon the printing-press, and the ink is applied to it.* The ink touches only where the wood was left. It does not penetrate to the places where the wood was cut away. Then the paper is applied and pressed down. The effect is, that all the lines are transferred to the paper, leaving those parts of the paper which come over the parts of the wood which had been cut away, white. Thus the picture is made.

One would not suppose it possible that lines so perfect as those which we see in some engravings could be made in this way. So apparently incredible is it, in fact, that many persons are quite unwilling to receive the explanation when it is made. But so it is. Every white space that you see—even those that lie between the finest lines of the most delicate shading—is produced by a nice cutting away of the wood in the face of the block from which the impression is made. To cut out all these fine lines is a work of great labor. It takes sometimes several weeks to engrave a single

* The ink is thick and tenacious, like pitch, and is put on very sparingly and carefully, with a roller.

Farther account of the process of wood engraving.

block, and the cost of doing it is very great; but when the block is once engraved, pictures can be printed from it with great rapidity. Thus, though the block itself costs a great deal, the pictures that are made from it, when it is finished, cost but little. Sometimes a hundred thousand copies are made from one block, and the cost of the block, averaged upon all these, makes a very small sum for each.

The cutting of the block for a fine engraving is a very delicate work, and it is quite trying to the eyes of the workman. The work is so fine that he can not do it with the naked eye. He uses a magnifying glass. The magnifying glass is attached to the end of a rod which comes up from the desk, and is bent in such a manner as to bring the magnifying glass directly under the engraver's eye as he sits at his work. This saves him the trouble of holding it, and leaves both his hands at liberty. With one of his hands he holds the block, and with the other he manages his tool. He supports the block upon a little stand made for it on the desk before him.

This being the way that pictures are made by means of an engraved block of wood, it is plain that it is very easy to make a white line in one. All that is necessary is to cut a smooth straight line in the wood from which the impression is taken.

It is much more difficult to make a black line in an engraving, for in that case the wood on each side must be cut away, leaving the line projecting.

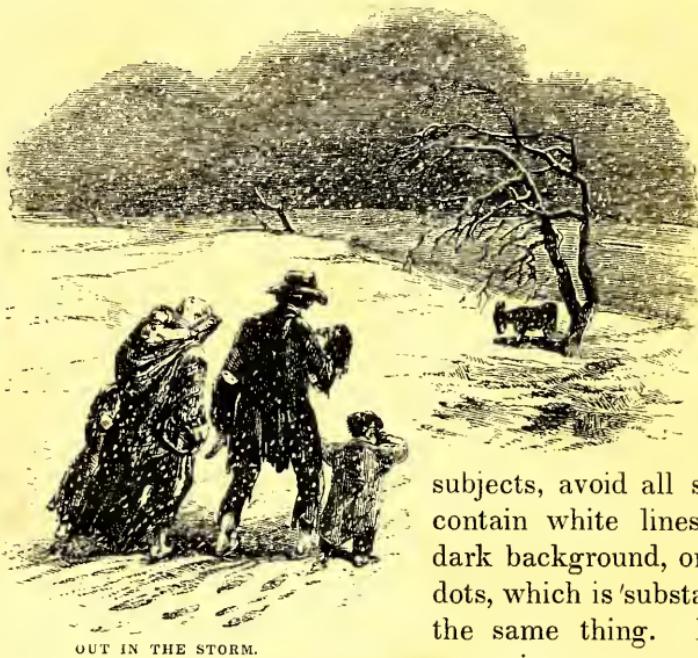
The converse is true in drawing on paper with a pencil or a pen. In this case, it is very easy to make a black line on a white ground, for to do it you have only to draw the point of your pen,

Picture of the snow-storm.

The poor wanderers.

or of your pencil, along the paper. On the other hand, it is very difficult to make a white line on a dark ground, for to do it you must fill up your ground with strokes of the pen or pencil, leaving the line. This is a very difficult operation.

When choosing models for drawing, therefore, from engraved



subjects, avoid all such as contain white lines on a dark background, or white dots, which is substantially the same thing. In this engraving we see a wretched

ed family traveling in a snow-storm. The flakes of snow are represented by white dots on the dark background of the sky and of the figures. These white dots were very easily made in the engraving. All that was necessary was to cut out a small place

The expression of the figures.The donkey under the tree.

for each one in the wood. It would be very difficult to make them in a drawing, by leaving the paper white, and drawing up close to them on every side with a pencil or a pen.

Observe how much expression of discomfort and fatigue the artist has given to these figures. The poor boy is crying with the cold. The sick child in the man's arms seems to be dying. Her wet and disheveled hair lies over her father's arm, and her delicate foot is seen hanging apparently lifeless by his side. How little you see of her face or form, and yet how much expression of sickness and helplessness that little reveals! The mother is very tired. She falls behind, and can hardly drag her weary limbs along. The baby clings to her back, cold and exhausted. The girl who walks by the side of her mother has some little strength left, but even she is very tired, and wet, and cold.

They are pressing forward toward the village, thinking that they may find there some place of shelter and a fire. I hope they will not be disappointed.

Let us always pity the poor.

See, too, how much expression the artist has given to the donkey that stands vainly seeking shelter under a leafless tree. He bows his head as if in submission to the storm, and looks forlorn and disconsolate.

Copy the donkey with a pencil or a pen, and see if you can give to your drawing the same character and expression that you see in the original.

The tree which is over him, though very finely represented in the engraving, would be very difficult to copy, on account of the white lines of snow on the upper sides of the branches.

Christmas.

The birth of Christ.

The English parsonage.

STUDY VII.

CHRISTMAS MORNING.

CHRISTMAS is the day that is celebrated as the anniversary of the birth of Jesus Christ. It is celebrated in a great many different ways in different parts of the world. In some places, however, it is not observed at all.

The place where Jesus Christ was born was Bethlehem, a town a few miles south of Jerusalem. There is a church built over the spot, and the room where Jesus is said to have been born is visited by great numbers of persons every year. The room is dark, being a sort of grotto, but it is kept constantly lighted by means of a great many silver lamps.

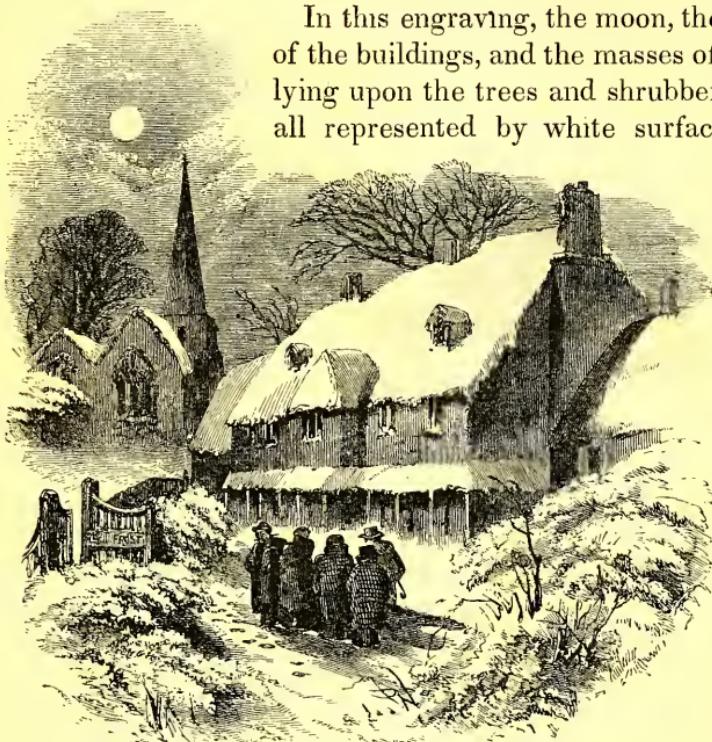
In England, the people of a country village come sometimes early in the morning of Christmas-day to sing Christmas hymns under the windows of the parsonage, as a salutation to the pastor. The engraving on the opposite page represents this scene. It is a cold morning. The shrubbery, the trees, and the roofs of the houses are covered with snow. The men are warm, however, being comfortably clothed, and they stand quietly in the garden of the parsonage, singing their hymn. The gate is open where they came in.

There is a piazza over the windows of the lower story of the parsonage. The roof above is thatched, but the thatch is now covered with snow. There are two projecting windows in the roof, but they are partly buried by the drifts. In the distance is

Picture of the parsonage on Christmas morning.

seen the spire of the church. Beyond it is the moon shining serenely in the sky.

In this engraving, the moon, the roofs of the buildings, and the masses of snow lying upon the trees and shrubbery, are all represented by white surfaces re-



THE CHRISTMAS SERENADE.

lieved against a dark ground; but, although the effect is produced thus by white upon black, it is not one which it is particularly difficult to imitate with a pencil or pen, because what are delineated in this case are white surfaces, and not white lines.

Cold morning.

The hay-rick.

The man and the dog.

It is much more easy to define a white surface by drawing the lines of shading up to the borders of it on all sides, than it is to define a white line in this way.

Look, for example, at the ladder leaning against this rick of hay. It is formed of very fine white lines, which it is easy to cut in the wood, but which it would be difficult, if not impossible, to *leave* in drawing upon paper.



UNDER THE HAY-RICK.

This rick of hay was piled up here in the field in the sum-

mer, to be used in the winter as occasion might require. A large portion of it has been already cut off and carried away. The man has come out to cut some more. His dog is with him. The dog is sitting down on the ground at his master's feet. The top of the rick is covered with snow, and it is snowing still. The man has been up upon the ladder, and has cut down as much hay as he can carry, and has tied it up in a bundle. The bundle lies upon the ground, ready to be carried away; but the man is stopping a moment to rest. His fingers are cold, and he is trying to warm them. He has taken his stand on the sheltered side of the mow. The dog by his side looks up to him, waiting till he is ready to go. We can see the fine sleet driving through the air. This driving sleet, where it is relieved against the clouds in the sky, or

Difficult to draw white lines.

The rocky precipice.

Imitation.

the dark side of the moon, is represented by white lines ; but when it is relieved against the snow, as is seen just to the right of the man, it is represented by dark ones. In the latter case, the lines could be easily imitated by the pen. In the former, it would be almost impossible to imitate them.

STUDY VIII.

BLACK UPON WHITE.

HERE we have an engraving in which all the effects are produced by black upon white, that is, by black lines upon a white ground. This work can be very exactly imitated by the pen. An artist accustomed to work with the pen would be able to imitate this drawing so precisely that it would require the very closest scrutiny to detect any difference between the original and the copy.



In undertaking to do this, his first care would be to select the paper. He would take different kinds of paper, and compare one with the other in the most careful manner, in order to find a specimen which, in color and texture, should be precisely similar to

that of the engraving. Then he would try the ink. If, on using one

An exact imitation.

Precautions to be used.

Character.

kind of ink, he found that it was not so black as that in the engraving, or was of a different shade or hue, he would take another kind, and another, until he should finally match the original. Then he would try his pens. He would examine the strokes and touches of the engraving with great care, and see if he could imitate them precisely, trying one pen after another until he found one that was right. The different lines in the drawing might require different pens. The trees, for instance, on the left, he might perhaps find could be more conveniently drawn with a pen of not so fine a point as would be required for the nice shading of the rocks. If so, he would provide himself with two or more, as might be necessary.

He would then practice a little upon a spare piece of paper to see if he could imitate precisely the different kinds of lines—the firm, smooth strokes which form the stems of the trees, and the fine shading of the rocks ; and, above all, the lightly-touched and tremulous lines which form the shading of the distant hills. After he had thus trained and prepared himself for his work, he would proceed to execute it.

All this particularity in respect to the color of the paper and of the ink is not at all necessary for those who only wish to learn to draw. Such niceness in these points is required only when you wish to produce a copy that shall be a very exact imitation of the original in all respects. But this close attention to the precise character of the *lines* and *touches*, and this great effort to imitate them exactly, in *their character*, is very essential to those who wish to make rapid progress in art.

I have said that such minute particularity as I have been de-

scribing, in respect to the points of pens, the color and the hue of ink, and the hue and the texture of paper, is not necessary as a means of learning to draw. It is very useful, however, to practice this sometimes, as a means of cultivating the habit of close and minute observation, and the power of seeing and appreciating small differences of color or of form.

There is a great natural difference between different minds in respect to exactness and precision, but there is a greater difference which results from education and habit. I was once conversing with a mathematical instrument-maker in respect to the workmen in his manufactory, and he told me that boys from the country, who had been accustomed to work with tools on a farm, and had been, consequently, in the habit of noticing when their tools were dull, and of watching the changes of the edge as they gradually sharpened them, acquired thereby what he called *nice ideas*, and they were much more apt and ready in learning to manage the nice operations of his work than boys who had been employed in stores, or as errand-boys in town, and who had, consequently, had no such training. But to return to the subject of drawing.

You can not be too particular in *noticing* the nice details of form and of touch in your model; but, in copying them, it is quite possible to take too much pains in imitating the strokes in a formal and mechanical manner, when it is far better only to imitate them in spirit. Girls are more in danger of erring in this respect than boys, and they should consequently be very careful to guard against the fault. They must study the touches in the model very closely, but they must only attempt to imitate them in *character*.

What I mean by imitating the touches in *character* is the mak-

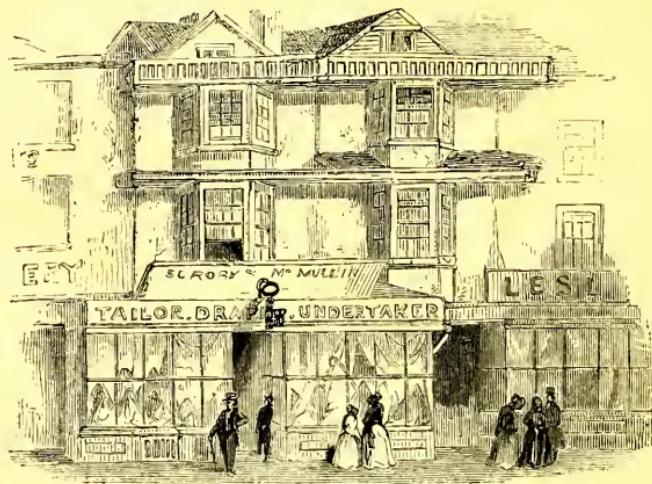
Important direction.

The shop front.

Studies.

ing of the lines in the copy the same in *kind* with those of the original, so that the shading shall have the same softness, and shall produce the same general effect. Take the clouds, for example, in the last engraving. It is obviously of no consequence that the external form of the clouds should be precisely the same in the copy as in the original, for that form is constantly undergoing change. All that is important is, that the clouds which you draw should be the same in *kind* with those of the original, so as to have the same expression. Any unusual expenditure of time and pains to give the shading precisely the same outline would be labor wasted.

Here we have another engraving—one of shop windows in a



A SHOP FRONT.

street, which is a very striking example of the effects produced

The drawing of the panes of glass.

The signs.

The key.

exclusively by black lines upon a white ground. All this can be imitated very closely with the pen. The whole drawing would, it is true, be too much for a beginner to undertake. There are some parts of it, however, which a beginner might copy very advantageously.

The effect of glass in the sashes of the windows is produced by perpendicular lines, very fine, and very close together, drawn partly down the pane, and then shaded off, leaving the lower part of the pane white. To copy one or two of these panes would be one very good lesson.

There are two signs over the door. The lowermost one appears to lie flat against the wall, while the upper one appears to lean forward. Study the drawing carefully, and see if you can discover how it is that the upper one is made to appear thus to lean forward.

If you succeed in finding out how this apparent leaning is produced, the two signs, with a small portion of the windows below the lower one, will make another excellent lesson for you to draw.

The key which is suspended from the uppermost sign seems to hang off from the lower one a little way. This effect is produced by means of the shadow. This shadow is made to fall upon the sign obliquely, and is thrown off at a little distance from the key, so as to show the light behind the key, between it and the shadow. To draw this key, and the shadow of it, as it is in the engraving, would be a third excellent lesson.

To copy the words on the lower sign—*drawing* the letters just as they are drawn in the engraving—would be another excellent lesson.

Some account of the Gipseys.

Their tents.

Construction of them.

STUDY IX.

T H E G I P S E Y S .

GIPSEYS are a wild and wandering people that roam about England, and encamp in any retired and shady places they can find, where they suppose that they shall not be molested.

The Gipseys in England are, in many respects, like the Indians in America, both in appearance and manners, and also in modes of life. They have swarthy complexions, and dark, straight hair. They wander about from place to place, encamping, when they stop, in some secluded spot on the margin of a village. They perform no regular labor. They make baskets and other similar things. The Gipseys pretend to tell fortunes too, and they often gain money in that way from weak and foolish people.

In this encampment there are two tents. They are placed under the spreading branches of some ancient trees. These tents are made in a very peculiar way. The frames are formed by slender and flexible rods of willow, with both ends of them set into the ground. These rods are of such a length, and the ends are set in the ground at such a distance apart, that they form in the middle an arch, which arch is covered afterward by a sheet of some sort of cloth, in the manner represented in the engraving.

These tents are very small and low, being intended only to sleep in at night, and perhaps for shelter too, in rainy weather. In pleasant weather the Gipseys sit upon the ground outside. They are sitting so now. Before the first tent a man is lying down

Picture of the encampment.

Food of the Gipseys.

Their cooking.

upon the grass at his ease. Farther on is a group gathered around a dish from which they have been eating their dinner. One of the women has a baby in her arms.



THE ENCAMPMENT OF THE GIPSEYS.

The dinners of the Gipseys consist sometimes of food already cooked, which they have begged at a neighboring house. Sometimes, however, they cook their own food. In this case they build a fire of the chips and sticks which they pick up on the ground, and then they hang their kettle over it, supporting their kettle by means of three short poles set in the ground around the fire, and joined together at the top. In the distance we see such a fire, with people sitting around it. Beyond is a donkey. The Gipseys use donkeys for bringing wood for their fires, and also for transporting their tents and their furniture from place to place when they change their encampment. They have, however, very

Story of an Indian boy adopted by a white man.

little furniture. Their kettle, their fire-poles, their dishes, and one or two baskets, constitute almost their whole supply.

Many people are surprised that Gipseys and Indians should prefer to live in this uncomfortable manner, without the conveniences of civilization, or any permanent homes, rather than to join with the civilized people around them, and live as they do. But the reason probably is, that when they are with civilized people they are always so looked down upon, and treated so much as a marked and inferior race, that they are impressed all the time with a certain sense of degradation.

There was an Indian boy, once, that was taken by kind people when he was a child, and brought up carefully as if he had been their own son. They sent him to school where he could be taught, provided him with comfortable clothes, and gave him a room and a bed in their own beautiful mansion. He lived with them some years. They tried to treat him just as if he were a white boy.

Still he was an Indian boy in fact, and wherever he went this thought was forced upon him. When he came among strangers, people all looked at him, and whispered to each other, That's an Indian. Whenever, in company, any one sat down by him, they would talk with him as to an Indian, not as to a white boy. It was evident that this idea was never out of their minds. The people of the neighborhood, in speaking of him, seldom called him by his name : they spoke of him as Mr. Thompson's Indian boy. In a word, he found himself marked and labeled, as it were, as belonging to a different and lower race from those who had so hospitably received him and had treated him so kindly. He felt, al-

He goes away into the woods again.

Great gateway.

ways and every where, that he was a foreigner—worse than a foreigner, in fact, being not merely of another nation, but of another race—and he found himself surrounded at all times with an atmosphere of repulsion, by which even his kindest friends were kept back from any thing like close and cordial union and sympathy with him. Accordingly, as soon as he grew up and was able to act for himself, he took leave of his kind benefactors and went away into the woods again, where he could stand on an equal and honorable footing in respect to his fellow-men, instead of being doomed to perpetual and hopeless inferiority.

Some people seemed surprised that he should leave his comfortable home, and all the pleasures of civilization, and go back to skins and wigwams ; but to me it seems that none but a very weak and ignoble spirit could decide otherwise.

STUDY X.

THE ANCIENT GATEWAY.

WHEN you look over a book of engravings to select something to copy, it is best to choose at first specimens in which the shading is light and the lines are open. Over the leaf there is a drawing of an ancient gateway which is of this character. Almost all the lines in the work are distinct from each other, which gives the drawing a very open appearance, and makes it easy to be copied. This kind of drawing can be imitated very closely by the *pen*. The lines of the shading in most places can be actually counted, and, if necessary, might be copied precisely, one by one. Such a

The "touch."

Motives of boys and girls in their attempts to draw.

drawing as this furnishes excellent practice to the pupil in learning what is called the touch, that is, in learning precisely how to manage his pencil or his pen, so as to produce the right sort of lines. The lines are very different in character as well as in form from those made in writing.

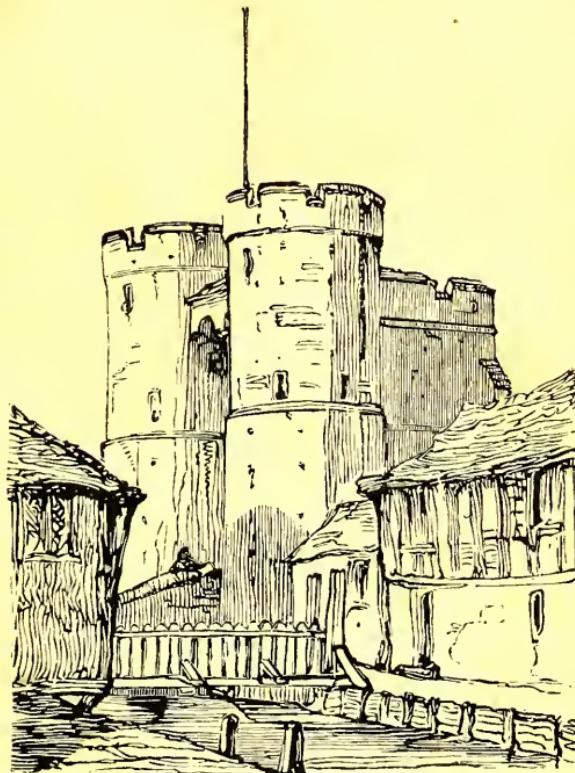
The only way to learn this touch is to imitate some part of such a drawing as this—the shading, for example, of the end of the building on the left—and then, after carefully comparing the copy with the original, and noting the difference, to try again and again. With proper care, you will find that at each attempt you come nearer and nearer to the original.

To pursue this course requires, however, much patience and also a high aim—a much higher aim than most boys and girls have who are trying to learn to draw. I have generally found the motive which actuates young persons in these attempts to be, apparently, not a wish to learn, but to surprise their acquaintances and friends by showing what they can already do. So they generally like much better to draw over and over again such things as they think they can already draw well, than to practice patiently on some new exercise, which would be the means of advancing them to higher attainments.

The gateway in this drawing consists of two towers, with loopholes at different heights for archers to shoot their arrows from, at the enemy. Below, and between the towers, is a bridge leading to the gateway. A man is standing on the bridge ; he is leaning over the parapet. This bridge crosses the ditch, which is a canal filled with water surrounding the fortress. A portion of the ditch is seen in the foreground. There is another bridge crossing this

Picture of the old castle.

ditch nearer to the spectator than the one which leads to the gateway. The nearer bridge is horizontal. The one more remote is



THE GREAT GATEWAY.

inclined. It ascends in the direction of the gateway. The horizontal bridge leads to some cottage-like buildings, which stand on the bank, under the walls of the castle.

The towers.

The parapet and the battlements.

Embrasures.

The towers, and also that part of the wall of the castle which is in view, are surmounted with battlements. These battlements consist of a parapet-wall carried up as high as a man's head, with openings left here and there through which the men behind the parapet can look out, and can also throw out their weapons. They can stand for an instant before the opening and look, or throw out a dart, or shoot an arrow, and then immediately fall back behind the parapet, where they are sheltered from the weapons of the enemy.

The openings in a wall or a parapet, made for the purpose of discharging missiles through, at the enemy, are called *embrasures*. The embrasures for cannon, in the walls of a modern fort, are pretty large. Those made in the parapets of castles and towers, in ancient times, were much smaller. In fact, the embrasure is made larger or smaller, in proportion to the nature of the missile which is to be sent from it.

Any thing thrown through the air is called a *missile*. Thus a cannon ball, or a bullet, discharged by the force of gunpowder, is a missile. There are various other missiles that are thrown by the force of gunpowder, such as rockets, bomb-shells, and the like; then there is a class of missiles that are thrown by the strength of the human arm, such as spears, darts, stones, and even snow-balls.

Every thing is represented in the preceding engraving by lines so simple and clear, and so distinct from each other, that they can be easily imitated with the pencil or the pen.

On the contrary, here is an engraving executed in a style which it is very difficult to copy, though the effect is very soft and beautiful. It represents a garden scene. There is a mass of shrub-

Picture of the garden-house.

Expression of repose.



THE GARDEN-HOUSE.

bery in the foreground on the left, in which the conical forms and dark foliage of evergreen trees is finely contrasted with the warmer and brighter expression of the roses and flowers below. In the middle distance, on the left, is a rustic building used for storing the tools and the seeds that are required in the garden. It has a wide door in front, so that the gardener may go in and out easily with his wheelbarrow load of tools or of straw

In the distance we see the roofs of houses, and the spire of the church rising above them. The whole is beautifully drawn and well engraved, and it wears an expression of quiet repose which it would be extremely difficult to imitate. It is true that a copy in outline of this view might easily be made, and afterward shaded lightly, in a style adapted to the pencil or the pen, and it would make a very pretty drawing-lesson indeed, but the peculiar expression of soft and gentle repose which the original wears would not be preserved in it.

The ruins of the old castle.

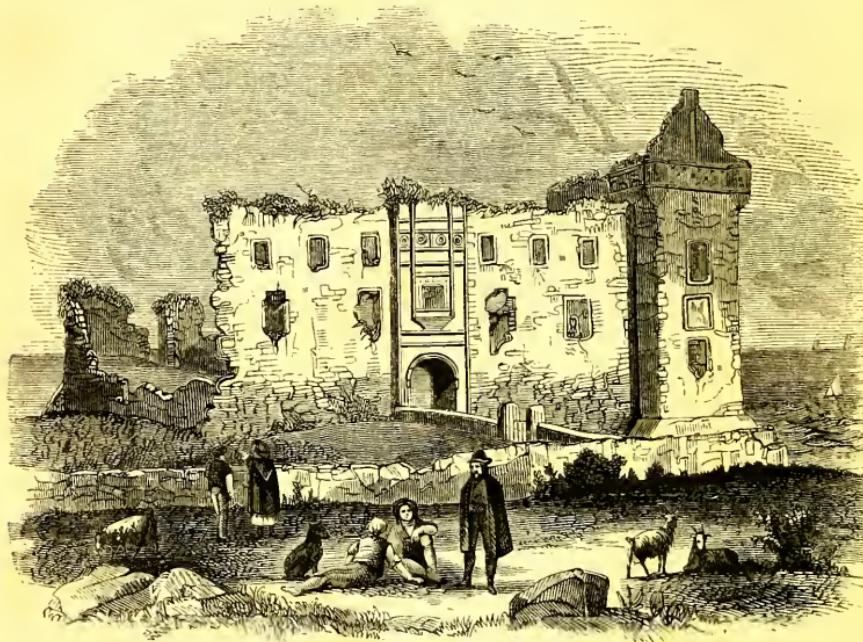
Roof gone.

The tower.

STUDY XI.

T H E R U I N S .

ON this page we have a view of ruins, which is drawn in a style intermediate between those of the two last. The lines of the



RUINS.

drawing are tolerably distinct, and yet many parts are finely shaded. The drawing represents the ruins of an ancient castle.

The manner in which the windows are represented.

The roof is wholly gone, and the top of the wall is fringed with plants which have taken root there, from seeds wafted through the air by the wind. The walls themselves, at the end, on the left, and in the rear, have fallen down. The front wall still stands, and is flanked by a square tower at the corner, on the right. The door-way remains entire, and several windows are seen, though some of them are broken away into ragged edged and misshapen openings. To draw such a ruin as this, with its crumbling walls and its broken lines of masonry, is excellent practice for the pencil or the pen. Before attempting it, however, the precise modes in which the various effects are produced should be carefully studied. Observe very closely by what lines and combinations of lines the windows are represented, and the seams and fissures in the walls, and the shading of the corners.

Look, for example, at the upper window on the left hand. I will describe the manner in which it is drawn, to illustrate the particularity with which every part of the drawing should be studied before beginning to copy it. The frame of the window is represented by a double line drawn around the opening. The lower part, however, is broken away. The opening itself is shaded by fine lines, drawn from above downward. If you examine these lines very closely indeed, you will see that there are five of them. Although they lie very close together, they do not touch each other in any part. Besides the shading produced by these lines, there is a mass of very dark shading within the opening of the window on the upper side, and on the right hand, which gives an appearance of depth to the opening, and produces a strong effect.

Mode of drawing the window.

Figures in the foreground.

Now, in copying such a window as this, it is, of course, not necessary to imitate all these details precisely, but it is very useful to study and understand them. Such a close examination of lines and touches as is implied in the preceding description is extremely important to enable you to understand exactly how effects of various kinds are produced ; and a very precise imitation of the model, in all these details, line by line, and touch by touch, is sometimes useful as an exercise, tending to develop and train the mind and the hand, to close observation and minute and precise execution ; but, in general, it is best to work much more freely in copying a drawing. A true and faithful copy is not necessarily a servile imitation.

In the foreground of the picture are groups of figures in various attitudes. Two laborers are reclining upon the grass, resting, perhaps, from some work which they have been employed upon in a neighboring field. A gentleman stands near them asking them questions about the ruins, and listening to their replies. Their dog is upon the other side of them, and he seems to be listening too.

Nearer the wall a man and a woman are standing. They appear to be looking at the ruins.

To the right are two goats. One of them is lying down. The other is standing, and seems to be looking out over the water. It may be that his eye catches the white sail of the little sloop which is passing across the field of view, and that he is wondering what it is.

Sculpture, painting, and drawing.The wounded boy.

STUDY XII.

THE HUMAN FACE.

ONE of the highest departments of art, not only in drawing, but in painting and in sculpture, relates to the expression of the human countenance.

In *sculpture*, the required expression depends upon the form which the sculptor gives to his marble by means of his chisel.

In *painting*, the end is attained by a nice arrangement and combination of colors, which the painter selects from his palette, and applies to his canvas, with infinite labor and care.

In *drawing*, the expression is given by very minute lines and touches from the pencil or the pen.

To express the passions and emotions of the mind by the form given to a block of marble, requires great genius, and long-continued and careful labor. To do it on canvas, by color, requires talent, long practice, and a cultivated taste. To do it in drawing requires only close and careful attention.

It is surprising with what slight touches an expression can be given to the face by a skillful artist. In the engraving over the leaf we have an illustration.

A boy has cut himself in the thigh, and his companion, another boy of about the same age, is acting the part of surgeon by binding up the wound. There was not time to bring the wounded boy into the house after the accident occurred, and so they have placed him in a chair by the door. On the ground, in front of the group,

The expression of the different faces in the group.

is a basin with a sponge, and by the side of it some cloths. With these the young surgeon has been wiping blood from the wound before applying the bandage. The name of this young surgeon is Astley.

Observe now with what minute lines and slight touches the several features are represented in the faces of the two boys, and how marked is the expression in both, and how different each expression is from the other.

What is the feeling which the expression upon the face of the wounded boy denotes?

The feeling of pain.

Is he giving way to the feeling, or is he endeavoring to bear it patiently and with fortitude?

He is plainly bearing it with all the fortitude in his power. He is faint, perhaps, from the loss of blood, but he still feels the pain, and is striving manfully to bear it. How plainly all this is shown by the few black dots and touches that represent his features!

Examine these touches now attentively, and see if you can discover what it is in them that conveys this meaning. The effect is produced mainly by the form of the mouth, which is drawn in such a manner as to appear compressed, and the nostril is also slightly distended. Examine this face with great care, and then take a pencil and see if you can imitate it. You will not succeed, probably, but the attempt will be extremely useful to you; and after making it, you will always look upon drawings of the human face more understandingly, and with greater interest, than before.

To copy such a drawing as this requires, as has been said, only

Picture of the wounded boy.



HE HAS CUT HIS THIGH.

The women.

The mother's distress.

Her countenance.

a close and attentive study of the model, and a minute and careful imitation of it. To produce the original drawing itself, in the first instance, is a very different thing. To do that requires a somewhat extended knowledge of the forms which the features assume in different states of mind, and of the manner in which the various expressions are given. But by carefully copying a great number of faces, this knowledge is gradually acquired.

Observe now the expression in the face of young Astley. Here there is no indication of pain, but only of calm and serious attention. He is intent upon his work—he feels the importance of it, but he is quiet and self-possessed, as one ought always to be in such a case.

Behind the boys are several women that have been drawn to the spot. They feel various degrees of interest in the case, and the countenance of each has, consequently, its own peculiar expression.

The one who seems most agitated and distressed is the mother of the boy. She stands beside him. She clasps her hands, and her countenance expresses great anxiety and terror. The one who stands behind the patient's chair, and seems disposed to render some help, if she can, is his aunt. Her countenance expresses sorrow and serious concern, but she is evidently much less terrified than the mother. The other spectators, who are coming up behind, show various degrees of emotion, the countenance of each conveying its precise and peculiar expression.

It would, however, be a mistake to suppose that the meaning and expression which these various faces assume are given to them altogether by the lines and touches with which the faces them-

A curious experiment described.Principle illustrated.

selves are delineated. The artist derives a great deal of aid in producing the desired effect by the position in which each of the figures is placed, and the attitudes which they severally assume. For example, the clasped hands of the mother of the wounded boy helps us very much in interpreting the expression of anguish which is depicted on the countenance. In the same manner, the drooping head of the boy aids very much in giving the fainting expression to his face ; and the raised hand of the woman in the background of the group conspires with the lineaments of her face to reveal to us her precise state of mind, and makes these lineaments seem to have more meaning than, when seen by themselves, they would really convey.

To prove this, a very pretty experiment may be tried. Take a piece of white paper, large enough fully to cover the engraving, and fold it in half, and then, with a pair of scissors, cut out a small semicircular notch on the folded edge. This notch should be about half as large as one of the faces of the engraving. Of course, when the paper is opened, there will be a circular hole in it large enough to show the whole of one of the faces. By laying this paper, now, down upon the engraving in such a manner as to bring one of the faces within the opening, you see the face itself alone, while all the accessories are concealed.

If you cover up all of the picture except one of the faces in this manner, and show the face alone to any one of your friends, and ask what the expression is which the artist meant to convey, he will probably be quite at a loss to determine it. But when you lift the paper up, and let him see the whole of the figure and the group, he will then see and understand the expression of the face

The snow-birds.

Plan of the boy for catching them

at once. "Oh yes," he will say, "I see now. It expresses pain, or fear, or distress, or terror"—or whatever the emotion may be

In order that this experiment should succeed, however, it is necessary that those who look at the face through the hole in the paper should not have seen the engraving before, for they must not have the least assistance in their conjectures from recollection of the scene.

STUDY XIII.

THE SNOW-BIRDS.

THESE boys have set a net, and are expecting to catch some snow-birds in it.

The net, which is circular in its form, is bordered by a frame to keep it extended. It is set up on its edge upon the snow, and is sustained in that position by a stick. There is a long line, one end of which is attached to the stick. The other end the boy holds in his hand. The line lies very loosely on the snow. The boy must first slowly draw in the slack of it, and then, if he pulls it suddenly, the stick will be pulled away, and the frame will fall down upon the ground. The boy will not spring his net in this way until he sees that one or two of the snow-birds are under it. If they are under it when it comes down, it will fall over them and make them prisoners.

There are two snow-birds hopping about upon the snow near the net. They are neither of them yet under it. The boy is watching them to see if they will go under it. Perhaps they may. But

Picture of the boy and the snow-birds.

The net.

if they do, it may be that the boy will not catch them. They may



FLY AWAY, LITTLE BIRDS !

fly away the instant that the net begins to fall, and so escape from under the net before they are caught.

If the boy catches the birds, I suppose he will put them in a cage and keep them. If he does, I hope he will be careful to feed them well.

Boys sometimes catch doves in this way. If they do so, however, they ought to treat their prisoners very kindly while they keep them, and give them their liberty as soon as they can.

A useful lesson in perspective is to be learned from this engraving, which is, that circular objects, when seen obliquely, appear of

A circle seen in perspective appears oval.

an oval form. The net, or, rather, the frame over which the net is spread, is round, and it looks as if it was round, while yet the actual form of the outline of it, as drawn in the picture, is oval.

It is only when they are seen obliquely that circular objects like this should be drawn of an oval form. If the net had been turned farther round this way, so as to stand square before us, it would have appeared round. This subject will be illustrated more fully in the two next engravings.

In the foreground on the left are two broken branches of trees lying on the ground. To copy them would be an excellent drawing lesson. Observe that the lower sides of the stems of these branches are shaded, while the upper edge of each is represented by a single light line. Copy these branches as they are, and then draw others of different forms, composing them yourself.

In the middle distance, on the right, is a man carrying home a bundle of sticks upon his back ; and in the background, on the left, is a man a gunning. His gun is over his shoulder, and his two dogs are running before him, endeavoring to find some game for him.

STUDY XIV.

T H E V O L A N T E.

On the adjoining page we have another illustration of the principle that a circle, seen in perspective, becomes an oval, in the form of the wheel of the volante. The volante is a sort of chaise used in the island of Cuba. It is drawn by two horses. These

Another illustration of the principle.

horses are driven by a negro slave, who rides upon one of them. This arrangement leaves the whole of the carriage for the ladies



TAKING A RIDE IN CUBA.

or gentlemen who ride in it, and affords them an unobstructed view. And, as the air in Cuba is almost always soft and balmy, and the sky serene, it is delightful to ride there in a vehicle so open.

Errors should never be copied.

Clerical errors.

The volante is represented in the engraving as coming toward us, and thus the wheels are seen obliquely. The right-hand wheel is seen in full. The other is in a great measure concealed by the carriage and the horses. The wheel that is seen shows the oval form which a circle assumes when seen in perspective, in a very distinct and beautiful manner. To copy this wheel would be a very difficult lesson, but it would be a very excellent one to any pupil who has patience enough to examine the engraving with sufficient attention, and to imitate it with sufficient care. Such a pupil will observe that the *side* of the rim of the wheel is in shadow, while the *edge* of it is white, and that of the *forward* part of the wheel, the outer edge is seen, while of the *back* part, it is the *inner* edge which comes into view.

Never copy errors in drawing. Errors are very likely to occur in drawing, as in writing or in printing. An error in writing is called a *clerical* error, from the word *clerk*, which means a writer.* An error in printing is called a *typographical* error, typography being the word that denotes the art of printing. Now, as it would be very absurd, in transcribing a passage from a book or from a manuscript, to copy an obvious error in the original, made by the writer or the printer, so it would be equally absurd to copy an error of the designer or artist in a drawing. Accordingly, just as you ought always to understand what you are transcribing, and correct any obvious errors which you may find in the words of the original, so you ought always to understand

* The word *clerical* denotes also that which relates to a clergyman or minister, as well as to a clerk or writer. The reason of its having this double sense is, that in very early ages clergymen were the only men who were taught to write.

Description of the figures in the engraving.

what you are copying in drawing, and correct any manifest error in the lines which the draughtsman or the engraver has fallen into in his work. Such an error you may see in the drawing of this wheel. The error is in the position of one of the spokes. The spokes of a wheel are always really equidistant from each other, but one of the spokes in this drawing is placed much nearer the one that is next below it, than it is to the one next above it. In copying the wheel, this error should be corrected.

The horses in this engraving are very beautifully drawn. Their harnesses are rich and highly ornamented, and they step proudly and gracefully as they trot along the smooth road. The two gentlemen who stand nearest are admiring them. Two others, standing together at a little distance on the right, are talking together on some business subject. They have their hands in their pockets. The one whose face is seen in profile is speaking ; the other seems to be listening very attentively to what he says. Palm-trees, with tufts of long, plume-like leaves growing from the tops of the stems, are seen rising here and there above the other foliage which adorns the scene.

STUDY XV.

BOATS UPON THE WATER.

THE water in this river has been swollen by the rains until it forms almost an inundation. The mill-wheel is half submerged, and the cellars of the houses are overflowed. Men and boys are going to and fro in boats. One boat is loaded with valuable goods,

Starboard and larboard.

Reflections in the water.

which the boatman is taking away to a place of safety. In the other, three boys are going out upon the water to survey the scene. Two men are seated near the bows of this boat, rowing. The larboard oar is visible. The starboard oar is concealed.* The artist has very prettily represented the water dripping from the end of the oar.



AN INUNDATION.

One of the boys holds his hands over the side of the boat, so as to draw his fingers through the water. The reflections of the white sleeves of the oarsmen are also shown. One reason why the artist made the sleeves of these rowers white was, that he might show the reflections of them in the water, for it is by show-

* The starboard side of a boat or ship is the right side. The larboard side is the left—as seen by a person looking from the stern, forward.

Variety.

The setting-pole.

The milkmaid and the cows.

ing such reflections that a smooth surface formed of dark lines is made to look bright like the surface of water.

The middle boy of the three who sit in the stern of the boat is dressed differently from the rest, and is a little taller. This gives variety to the group. It varies, also, the reflections in the water.

The man in the second boat is not rowing. He is pushing the boat off from the shore by means of a pole. Such a pole is called a setting-pole. The figures in these boats would be somewhat difficult to draw, but the boats themselves are excellent studies, showing, as they do, the different forms which boats assume when seen in different positions on the water.

The group of buildings, too, on the farther shore of the river, with the roofs in their various positions, the windows, round and square, and the foundation walls of masonry, would form an excellent lesson to be copied by the pencil or the pen.

STUDY XVI.

THE MILKING.

THE cows have come to the corner of the field, and they stand there resting quietly under the trees, while the milkmaid milks them. She sits upon her three-legged stool. The pail in which she is milking is before her, concealed from view.

Turn over the leaf and you will see the cows standing under the trees, and the milkmaid sitting on her stool, but not the pail in which she is milking.

Brunie and Bess at the milking.

The milkmaid and the plowman.

Another pail stands on the ground by her side. The cow that she is milking is white. Her name is Bess. The other cow is red. Her name is Brunie. The pail which we see is already filled with Brunie's milk, and soon the other pail will be filled. Then the milking will be done. Brunie is waiting for her companion to be released, and then both the cows will go away together. They are companions and friends.



TWO PAIRS OF FRIENDS.

too. Her friend is the young plowman who stands on the other side of the stile, talking with the milkmaid while she is milking. He leans upon the topmost bar of the stile. He is tired with his day's labor, and is waiting for the milkmaid to finish her task, and then they, too, will go away together. Although he is tired, he will still not allow the milkmaid to carry either of the pails of milk. He will himself carry both of them for her.

Thus we have, in the peaceful and quiet scene represented in this engraving, an image of the pleasure of companionship and

Brunie and Bess in solitude and seclusion.

sympathy. We have two pairs of friends, the partners of each pair being drawn together by a very strong, though invisible tie. One partner in each pair is waiting for the other. When the man and the maiden go away together in one direction, Brunie and Bess will go away in another, and, lying down upon the grass in some sheltered spot, they will ruminant peacefully, side by side.



BRUNIE AND BESS.

They can not talk, nor can they in any way communicate their ideas. They will have, in fact, no ideas to communicate. They will, however, each enjoy the presence of the other, for to have a friend and companion near is a pleasure even for cows.

Sometimes an artist attempts to represent an idea.

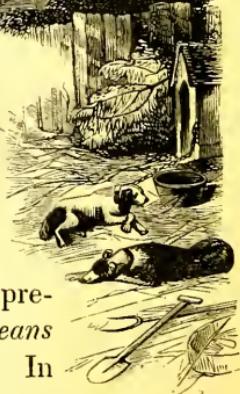


THE SUMMER MORNING.

STUDY XVII.

REPOSE.

SOMETIMES the artist, in making a drawing, undertakes to represent an *idea* rather than an object or a group of objects, or, to speak more precisely, he undertakes to express an idea *by means* of the object or group of objects which he draws. In the above engraving, the idea which the designer seems to have attempted to express is that of *rural repose*.



Description of the picture.

Images of quiet and repose.

With the view of representing this idea, he has selected such objects and such forms as shall best exhibit the aspect of calmness and peace. On the left, in the foreground, is seen a small surface of water, beneath a mossy bank, half shaded by the trees which hang over it, and half brightened by the reflection of the sun. Beyond is a church, its simple and massive form reposing calmly in the still morning air. The tomb-stones of the church-yard are seen clustering under its walls. The gate at the entrance is shut. No one is coming out or going in. By the side of the great gate is a smaller one. That is shut too. By the side of the small gate is a flight of steps leading over the wall, for children to go up and down in getting into the church-yard when the gates are shut. At the top of these steps are two stone posts, one on each side, to keep the children from falling; and beyond, within the yard, though out of sight, are steps leading down. They thought it best to make these steps for the children, rather than to allow them to pass through the gate, for fear that they might leave the gate open.

There are no children now going up or down these steps. All is solitary and still.

Beyond the steps is a large cottage. It is a double cottage, and the roof is thatched. It is an inn. We know that it is so by the sign which hangs suspended over the roof. There is a little trough or rack, too, by the side of the door, where they feed the horses of travelers that come to the inn. There are, however, no travelers or horses there now; the doors are shut, and all is solitary and still. The sun shines upon the roof, and the foliage of the trees that rise above it seems to repose motionless in its beams. By

Figures introduced.

They harmonize with the scene.

the side of the inn is a large gate leading into a yard ; but it is shut, and there is no one near it.

This scene, though designed by the artist to express silence and repose, would have appeared vacant and desolate if there had been no living things to be seen in it. The artist has accordingly introduced in the foreground, on the right, a shepherd driving a small flock of sheep. The shepherd walks very slowly along, his pack upon his back, and his hand hanging by his side. The sheep are scarcely moving. The foremost one stands looking at some object that has attracted his attention, and seems basking in the rays of the warm sun. Still nearer, in the foreground, is a kennel, by a fence in the corner of a yard, with two dogs asleep on the straw at the door of it. One of them is chained ; the other is at liberty, but both are lying asleep in the sun. Still nearer, a pitchfork and a spade are lying idle upon the ground, the symbols of rest from labor. Thus over the whole scene there reigns an expression of peace and repose.

STUDY XVIII.

THE WINTER NIGHT.

THE last engraving was intended to represent the expression and effect of a warm summer's day. The one on the next page is the reverse. The subject here is the cold and gloomy aspect of a wintery night. See how admirably the artist has succeeded in accomplishing his object in this case as in the other.

The man upon the horse is the English postman coming to the

The postman coming with the letters in a storm.



COLD NIGHT.

door of an inn, in a remote rural district, to deliver his mail. He has his valise strapped on behind him. His mail-bags are by his side. There is an expression in his attitude of shrinking from the cold, but he does not appear to be particularly tired. On the contrary, there is a certain briskness in his air, as if he were in haste to deliver his mail-bag and go away. We see beneath him, in the snow, the tracks which he made in stepping restlessly about

The night is windy and boisterous.

A contrast.

while the innkeeper was coming. He now regards the innkeeper at the door with a lively and animated look, in which a certain degree of interest and curiosity are very plainly seen. He turns his face away from the sleet and rain, which are driven against him by the blustering wind of the night. That the night is blustering and windy, we see by the swinging of the tavern sign and the waving of the horse's tail, the driving of the rain and snow, and the attitude of the innkeeper, sheltering himself, as well as he can, from the blast, behind the half-opened door.

To be able to copy forms exactly is a comparatively simple branch of the art of drawing. It is sometimes called the mechanical part. Any one who is capable of close and attentive observation, and of persevering effort, can succeed in learning it. But to select such forms, and to delineate them in such a manner as to convey the expression of an idea, requires genius.

Compare, now, this winter night scene, as represented on the last page, with the noon-day scene in summer of the last study, and observe how strong the contrast is between the two, not merely in the objects which they represent, but in the whole character and expression of the view. The one is warm, sunny, and glowing. The other is cold, chilly, and forbidding. The one seems to repose in an atmosphere of calmness and peace. The other shows us a night wild and blustering, with sleet and rain driving through the murky air.

The poet asleep by his winter evening fire.

STUDY XIX.

THE POET ASLEEP.

In this study we have a drawing that is also very strikingly expressive, though the expression is of a character entirely different from either of the preceding.

It represents the poet Cowper asleep before the fire in a winter evening. We do not actually see the fire, but we see the glow of it upon his face and upon the room. In the foreground, on the right, we observe the corner of the fender, with the handle of the poker resting upon the edge of it. Observe the shadow of the poker on the side of the fender below. Above,



we see the corner of the mantel-shelf, with the light of the fire reflected from the under surface of it. This reflection, and the

Description of the furniture of the room.

strong shadows which we observe in various parts of the picture, tell us plainly that the fire is burning bright. See how the sleeper seems to be basking in its beams. His eyes are closed, his hands are folded upon his knees, his arm rests upon the elbow of his chair, and his whole form has subsided into such an attitude of repose, that the drawing presents us, as it were, with the visible embodiment of sleep.

There are books upon the table, but no lamp or candle there. It is obvious that there is no light in the room except that of the fire. This is plainly indicated by the character of the shadows which fall from the head and limbs of the figure upon the chair, and from the manner in which the glow of the fire is reflected from the table-cloth, and from the carpet, and from the curtain, and from the person of the sleeper, and by the dark obscurity which reigns in the back part of the room. We see no furniture beyond the chair and table, except the faint outline of an oval mirror hanging against the wall.

STUDY XX.

A N E M B L E M.

SOMETIMES the drawing which the artist makes is expressive and ideal in a still higher degree than those in the preceding studies, and even in a different sense from those. In those, the subjects represented were scenes of external nature, which the artist idealized only by giving to them, as much as possible, their true and characteristic expression. Sometimes, however, an artist goes

A symbolical picture.

Lines from Thomson.

farther than this, and, taking some *thought*, or *conception of the mind*, attempts to symbolize and embody it by means of the appropriate natural images. Such drawings as these require a poetic genius in the artist.

This engraving is meant to symbolize the analogy between the



THE EVENING OF LIFE.

close of human life and the winter of the year. It was drawn to illustrate the following lines :

“ ‘Tis done ! Dread winter spreads his latest glooms,
And reigns tremendous o'er the conquered year.

Images and emblems of old age.

How dead the vegetable kingdom lies !
How dumb the tuneful ! Horror wide extends
His desolate domain. Behold, fond man !
See here thy pictured life ; pass some few years,
Thy flowering spring, thy summer's ardent strength,
Thy sober autumn fading into age,
And pale, concluding winter comes at last,
And shuts the scene."

An old man reclines, sleeping in his chair, his countenance indicating the approach of death. His head is supported by pillows, and the few scanty locks of hair which age has left him repose upon his shoulder. By his side stands an hour-glass—the usual and appropriate emblem of the lapse of time. In the foreground, on the right, is a grave. The spade lies by the side of it, and the rope also, by which the coffin is to be let down. The man beyond the grave is a pilgrim. He has his scrip by his side, and his staff in his hand. He is drawing near to the end of his journey, and is looking back to survey the road that he has traveled during the day. The landscape in the background is wintery and drear. The foliage has fallen from the trees, and the ground is bare. The only appearance of flowers and verdure that remains is that which adorns the margin of the grave. These flowers are intended to symbolize the beauty, peace, and joy to which the soul is to be ushered in passing through that dark and gloomy portal. The life and beauty which have gone from every other part of the landscape still linger here, as if to cheer and sustain the heart with a promise of a joyous resurrection.

In the distance, the sun, obscured by clouds, is sinking slowly down to the western horizon.

The blacksmith.

The expression of his countenance.

STUDY XXI.

THE BLACKSMITH.

THIS is the picture of a blacksmith. Observe the expression of close attention in his countenance. He grasps the iron in the tongs, which he holds with his left hand, while with his right he wields his heavy hammer.



CLOSE ATTENTION.

He is looking very intently at the iron, and he strikes it now with gentle blows, as he has brought it very nearly to the required form. Examine his countenance closely, and

see if you can discern by what means it is that the artist has given to it such a look of fixed and earnest attention.

In the background of the picture, behind the smith, we see the face of the boy who is blowing the bellows. The expression of his countenance says that he is tired of the work, and wishes to be away. We do not see the bellows, nor even the handle of it, nor the arms of the boy working the handle. The artist has concealed all these things on purpose, in order that he might tell the whole story by the expression in the face of the boy. How evident it is that he is doing one thing and thinking of another—that

The principle on which the tongs of the blacksmith are constructed.

he is looking away from his work, and wishing that he was released from it ! To express all this merely by the manner of delineating the features of so small a face is a great triumph of art.

We see the fire burning on the forge, with a sort of hood or funnel above, made to receive the smoke, and conduct it into the throat of the chimney. The anvil rests upon a heavy block of wood, and this upon a solid mass of masonry, which is not seen in the engraving.

Such a foundation is always built where an anvil is to stand, as it is necessary that the anvil should be supported in the most fixed and immovable manner, so as not to yield in the least under the blows which it is to receive.

The blacksmith's tongs are made on a different principle from those used about a domestic fire. It is not necessary that they should open wide, for the piece of iron which they are to grasp is always small ; but it is necessary that they should hold the iron with a very strong grip, that it may not be moved from their hold by the blows of the hammer. The tongs, on the other hand, for handling wood at a common fire, must open wide, for the wood is often large ; but it is not necessary that they should grasp the wood with any extreme tenacity. The blacksmith's tongs have long handles and very short jaws, as will be seen by the specimens in the engraving ; and the fulcrum, or joint, is placed between the handles which are grasped by the hand, and the jaws which hold the iron. In the fireside tongs, on the other hand, the fulcrum or joint is at the top. The hands take hold below, near the fulcrum, where the motion of the arms is small, and the wood is grasped by the extremity of the arms, where the motion is great,

Lines converging in perspective to the point of sight.

and the arms can open wide. Thus, in the fireside tongs, a large mass can be grasped, but it can be held only very lightly. In the blacksmith's tongs only a small mass can be grasped, but it can be held with prodigious force.

The deep contrast of light and shade in this drawing, and the smooth and soft finish of the work, give it a very spirited and beautiful effect. Examine closely the dress of the smith at the shoulder, and notice the peculiar manner in which it is shaded, and also the wrinkles of the dress at the flexure of the elbow.

STUDY XXII.

THE POINT OF SIGHT.

THE principle of perspective that is explained in the Fifth Study in this book is often beautifully illustrated in views of streets. The principle is, that lines receding from the spectator will appear, in the drawing, to converge, though they are really parallel. Accordingly, when we look down a street, the lines which are formed by the architecture, and by rows of objects seen in the street, all seem to converge, and finally to come together in the distance, if they are continued far enough.

Over the leaf is a view of a street. We can see in it four or five of such lines as are referred to above. The edge of the sidewalk on the right is one. So is the edge of the sidewalk on the left, only it is somewhat concealed by the carriage which stands before the Astor Library, and by the trees beyond. The range of the roofs of the houses on the left is another such line too,

View of Lafayette Place in New York.

only it is somewhat broken by the roofs of some of the buildings rising above, and of others falling below, the rest. The range of the tops of every row of windows, and also of the bottoms of them, as well as that of the tops of the trees, form lines which all converge to a point, near the centre of the picture, at the end of the street.

The street represented in the engraving is Lafayette Place,



New York. On the right, behind the trees, is a range of very magnificent houses, called the Colonnade Houses, from the fact that there extends along the front of the whole block a range of

Lafayette Livingston.

The Astor Library.

Lucinda.

marble pillars, which form a very grand colonnade. The commencement of this colonnade can be seen near the foreground, on the right, near where the man is walking alone. On the opposite side of the place, near the foreground, on the left, where the carriage is standing, is seen the front of the Astor Library.

In one of the houses in this Place there lived, a short time since, a wealthy family of the name of Livingston. It happened, singularly enough, that there was a boy in this family whose name was the same with that of the place in which he lived, namely, Lafayette. His name, in full, was Lafayette Livingston.

One rainy afternoon, Lafayette went into the Astor Library to see the books, and that evening, just before the family were called out to tea, he told his little sister Lucinda that he was going to learn to draw.

"Are you?" said Lucinda.

Lucinda was sitting, at this time, on a splendid tabouret, which stood in the corner, by the fire. She was playing with her kitten. A tabouret is a small square seat, made very soft, and covered with an embroidered covering.

"Yes," said Lafayette. "I saw a magnificent book of drawings in the Astor Library this afternoon, and I am going to learn to copy them."

"I should like to learn too," said Lucinda; "will you show me?"

"Oh no," said Lafayette, "you are not old enough to learn to draw."

Just at this time a little silver bell was heard ringing for tea, and the children went together out into the tea-room. The tea-room was a small but beautifully furnished room. There was a

Lafayette's request of his father.

Various kinds of pencils.

rich, soft carpet on the floor, and curtains of crimson silk to the windows, and silver plate and elegant porcelain on the table, and a gilded chandelier hanging from the ceiling, which was lighted up brilliantly with jets of gas, that burned resplendently within cut glass globes.

"Father," said Lafayette, "I want you to give me some money to buy a set of pencils with. I am going to learn to draw."

Mr. Livingston did not answer. He was busy reading the evening paper. The light from the chandelier fell bright upon the paper, as Mr. Livingston sat at the corner of the table, with his feet toward the fire.

"Father," said Lafayette, still repeating his request, "I want you to give me a dollar to buy some pencils with."

Still Mr. Livingston did not answer.

"Don't interrupt your father," said Mrs. Livingston. "He is reading the newspaper."

"But I want some money to go to Lockwood's, after tea, and buy me some pencils," persisted Lafayette.

"You don't need a dollar for that," said Mrs. Livingston. "You can get a very good pencil for sixpence."

"But I want a set of them," said Lafayette. "They come in boxes. There is an H., and an H. H., and an H. H. H. And then there is a B., and a B. B., and a B. B. B. I must have all the kinds, or else I can't do any thing at all."

"Then, besides," continued Lafayette, "I must have a Drawing Book."

"What do you mean by a Drawing Book," asked his mother: "a book to draw in, or a book to draw from?"

Lafayette importunes his father for some money.

"Why, both," said Lafayette; "I need both. I need a book of drawing paper to make my drawings in, and then I need a book of drawings to copy. But I can get them both at Lockwood's."

Lockwood's is a large and very convenient book-store, below Lafayette Place, in Broadway.

"Oh, that is too extravagant," said Mrs. Livingston. "You can find something in your picture books to copy at first, and a sheet of drawing-paper, which you can buy for a shilling, will be enough to last you a long time."

"Oh no, mother," said Lafayette, in an imploring tone, "I must have a regular drawing-book, and a book of drawing lessons, or a pack of drawing cards. I can get all I want for three or four dollars."

"Father!" said Lafayette. Mr. Livingston had got to the bottom of his paper on one side, and was at this instant turning it over, so that Lafayette thought that now was a good time to speak to him.

"Father," said he, "I want you to give me three or four dollars, to buy me some drawing materials. I am going to learn to draw."

"Nonsense!" said his father. "You would only draw one or two lessons, and then give it up. It would be money thrown away."

So Mr. Livingston went on reading his paper, sipping his tea from time to time as he did so. Mrs. Livingston made a secret sign to Lafayette not to ask for the money any more. Lafayette understood that she would give it to him herself.

Accordingly, about half an hour afterward, Mrs. Livingston

He obtains money of his mother.

He goes to Lockwood's.

brought her purse, and, taking out a five dollar gold piece from it, she gave it to Lafayette, and told him that he might go to Mr. Lockwood's and buy what he required.

So Lafayette, putting the gold piece into his pocket, went out into Broadway. He held up his finger to the driver of an omnibus that was going by.* The driver drew up to the side-walk, and Lafayette got in. The street was brilliantly lighted up. Thousands of people were going to and fro upon the broad walks that extended along the sides of it, while omnibuses, carriages, and carts, in great numbers, were thundering over the pavement in the middle.

Lafayette soon reached the book-store and went in. One of the clerks showed him a variety of boxes of pencils. Lafayette chose a set of Faber's, that were put up in an ornamented morocco case. He then inquired for drawing books, and the clerk opened a drawer which contained a great number of them—some English, some French, and some American—and also several packs of drawing cards. There was one drawing book and one pack of cards which Lafayette liked better than any of the others. For a time, however, he was at a loss whether to choose the book or the pack of cards, and so he finally decided to take both.

He also selected a large blank book, the leaves of which were formed of drawing paper of the best quality. The price of it was a dollar and twenty-five cents.

He bought, also, two pieces of India-rubber for sixpence each. They were fresh and nice, oblong in form, and with very smooth sides and square edges.

* In another Study you will see a picture of a New York omnibus.

He buys his materials.

He repairs to the library.

On reckoning up the price of these articles, Lafayette found that he would have three quarters of a dollar left of his half eagle. So he concluded to buy a knife with that, to sharpen his pencils with.

Then he went home.

Mrs. Livingston was somewhat sorry when she learned that Lafayette had expended the whole of the five dollars upon his purchases. She told him that he had been too extravagant.

"However," she added, on reflection, "it is no great matter, after all, if you will only persevere and learn to draw."

"Well, I will," said Lafayette. "I am going to begin this evening. I am going to draw in the library. Come into the library with me, Lucinda, and be my company."

Lucinda, who was always very kind and accommodating, acceded very readily to this request, and so the two children went into the library together. The library was a very elegant room. There was a large and handsomely-carved library table in the centre of the room, with drawers in the sides of it. The table was covered with broadcloth, and was furnished with two massive bronze inkstands, and with all necessary writing implements in great abundance. There was a beautiful silver-bound writing-desk at one end.

The apartment was richly furnished in all respects, with cabinets, commodes, globes, statues, and other similar appointments, and there was a set of mahogany book-cases, with plate-glass doors, extending across the whole back side of the room, and filled with costly and beautiful books. The windows were hung with splendid damask curtains, and between them was a desk, with a gas-burner at each side of it.

His preparations and arrangements.

Conversation with Lucinda.

"I'll light the gas," said Lafayette to Lucinda, "while you turn the register."

The room was pretty well lighted when the children came in, for there was a small chandelier over the table in the centre, which was kept always burning. But Lafayette concluded to use the desk between the windows instead of the table, so he wished to light the burners there. He accordingly went to the mantel-shelf, and, opening a bronze box which stood by the side of the clock, he took out a match, and with it he lighted the two burners, while Lucinda turned the register.

The register was a round opening in the corner of the room, made to admit hot air from the furnace below. The room was pretty warm when Lafayette went into it, but he wished to make it a little warmer.

"Now," said he, "the first thing is to sharpen some of my pencils." So he took his seat at the desk, opened his box, and began to sharpen his pencils. Lucinda came and stood by him.

"What a pretty box, and how many pencils!" said she. "I think you might let me have one of them, you have got so many."

"No; you could not draw," said Lafayette. "You are not old enough. Besides, you have not got any paper."

"I can find some paper in one of the drawers, I think," said Lucinda, speaking in a mournful tone, as if she was sorry that Lafayette was not willing that she should learn to draw.

Lafayette did not reply to this suggestion, but having by this time sharpened a B. and a B. B., he opened his book of drawing lessons, and began to look over them, in order to find something that looked easy to be copied.

Lafayette's opinion of first lessons.

The barn and the barn-yard.

The first drawing lessons which Lafayette came to, at the beginning of his book, when he first opened it, consisted of straight lines, squares, circles, and other diagram-like looking figures.

"What are all these things?" asked Lucinda. "What are they pictures of? Do you know?"

"Oh, they are not pictures of any thing," said Lafayette. "They are only lessons for practice. They are to teach us to draw straight lines, and squares, and rounds. But I am not going to draw any of them. I am going to turn over till I find something pretty."

So saying, Lafayette went on turning over the leaves of his book, in search, as he said, of something pretty.

"But I should think you ought to begin at the beginning," said Lucinda. "At least I would."

"No," replied Lafayette. "I want to find something pretty."

Very soon, Lafayette came to a picture of a barn, with a wheelbarrow near the door, and some hens and chickens scratching about the ground, in the barn-yard. The scene was represented by only a few simple lines, for, being near the beginning of the book, it was intended for beginners.

"Ah!" exclaimed Lucinda, when she saw this picture; "draw that barn, and the hens and chickens. That is very pretty indeed."

"No," said Lafayette. "That picture is not shaded. Such pictures as that are only meant for little children to draw. I want something that is shaded and finished."

Lafayette finally makes choice of a model.

STUDY XXIII.

THE FLUME.

AFTER examining and rejecting a great many lessons, Lafayette came at last to a decision. The lesson which he chose was a view of a chasm among rocks, with a stream and a waterfall. In the foreground was a small bridge, made of a single plank, and supported by stakes driven down through the water. On one side of the bridge, near the end, where the bridge was highest above the rocks, there was a short railing, formed apparently of a bent pole. Beyond, on either hand, were perpendicular rocks, and in the distance a narrow chasm, through which the stream of water was seen flowing. This stream flowed in the direction toward the foreground, and there it fell over the rocks, forming a beautiful cascade. The chasm through which the water came was very narrow and very deep. A large stone had fallen into this chasm, and had got wedged there in a manner which seemed, both to Lucinda and Lafayette, very curious indeed. Indeed, it was this stone, in a great measure, which decided Lafayette to choose this lesson.

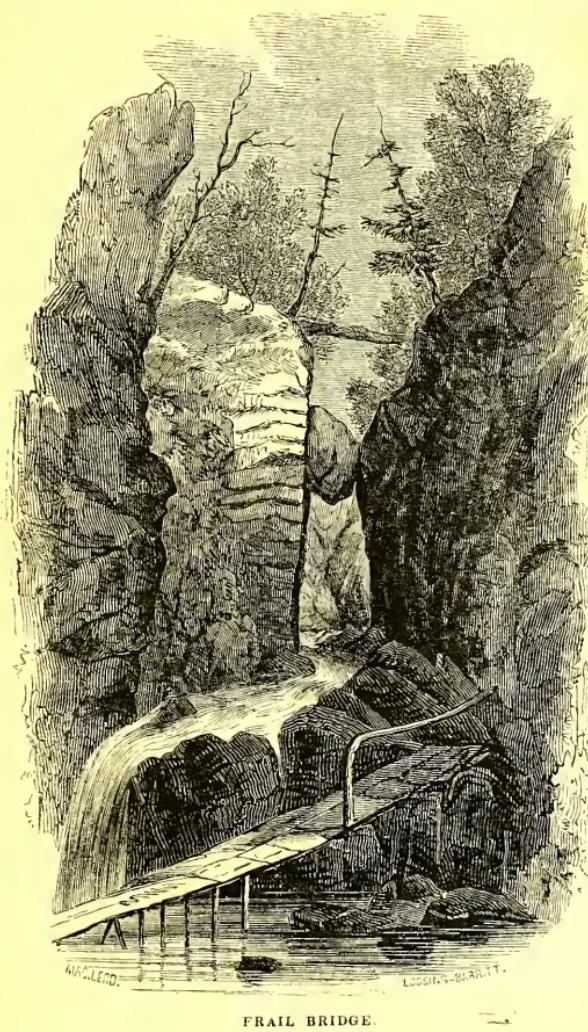
Above the chasm, upon the brink of the precipice, on either hand, there were fir-trees, whose tall stems leaned precariously over the abyss.

"How I should like to walk down along that bridge!" said Lafayette.

"I should not dare to go there," said Lucinda.

Lafayette's model.

Conversation concerning it.



FRAIL BRIDGE.

"And I should like to climb up to the top of those rocks," added Lafayette.

"You certainly would fall," said Lucinda.

"No," replied Lafayette. "Do you see that log, extending across the gap from one side to the other?"

"No," said Lucinda, "it does not extend quite across."

"Yes," rejoined Lafayette, "it extends across it entirely; but one end of it is partly hidden in the bushes. Do you suppose I should dare to go across on that log?"

Reasons for Lafayette's choice.

His mistake.

Surf rolling.

"No, indeed," replied Lucinda.

"I *should* dare," replied Lafayette. "I should not be at all afraid to go across on it."

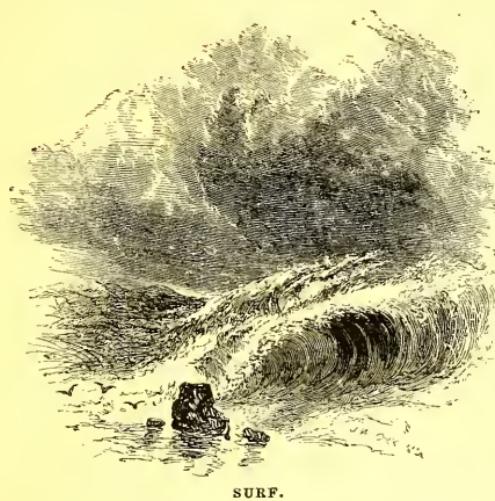
Lafayette had a very exalted opinion of his own courage.

There were two reasons why Lafayette chose this lesson for his first attempt at drawing. One was, that he thought it a view of a remarkably pleasant place; and the second was, he imagined that it would be easy to draw. Like most boys, whose motive in drawing is not to learn, but to make a display to others of what they can do, he looked for something easy; but he was greatly mistaken in supposing that this subject would be easy. There is nothing more difficult, in fact, for a beginner to draw, than a view of rocks and water; for the objects seen in such a view have no well-marked and familiar forms, by the outlines of which they may be known and identified to the imagination of the spectator. The artist is dependent, in copying them, upon the character which he gives to them by the various tints that he can impart to the shading of the different surfaces. This, now, is a nice and delicate performance, and one which it is very difficult for a beginner to imitate.

Water in motion is especially difficult to represent in drawing, whether the motion be the running of streams or the rolling of waves. On the opposite page, for example, is a view representing the surf rolling and breaking upon a rocky reef at sea. The idea is expressed in such a subject as this, not by means of characteristic outlines, defining expressive and familiar forms, but by the delicate gradations of shading to denote curved and broken surfaces. This kind of work is very difficult indeed, and such

Picture of the surf.

Remarks upon the drawing of it.



SURF.

subjects are, therefore, not at all suited to beginners. You will find it much better, therefore, when you are beginning, to choose subjects in which the expression and effect of the drawing depend more upon the forms that are delineated in it, than upon gradations of light and shade in representing surfaces.

The subject which La-

fayette had chosen was therefore not a good one. He, however, opened his blank drawing book at the first page, and began. He sketched a little, and then rubbed out his lines; and then he sketched a little more, and then rubbed out more, Lucinda standing by his side all the while, looking on. Lafayette soon found, however, that he was not likely to succeed in making a good copy of the drawing, so he scribbled over his work, saying as he did it,

“Poh! that is not a good subject, after all. I’ll take another, and begin again at the other end of the book.”

So he turned the book end for end, in order that he might begin again on a fresh page.

“Now,” said he, “I am going to have something prettier for a pattern. Rocks are pretty things to go and see, but they are not nice to draw. Ah! here’s a horseman! I’ll draw this horseman.”

Some account of the omnibus.

Door behind.

Reason for it.

STUDY XXIV.

T H E O M N I B U S .

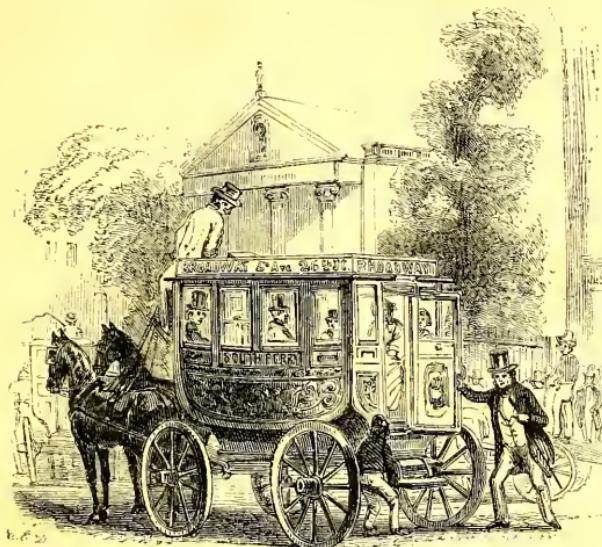
In this study we see the form and character of a New York omnibus — such a one as Lafayette Livingston rode in down Broadway, when he went to buy his drawing materials. It will be well to describe the omnibus here, for this book will be read by a great many boys and girls in the interior of the country who have never seen one ; and even those who live in cities, and who are accustomed to see omnibuses every day, will perhaps take some interest in examining this picture, and reading the description, for we often take great pleasure in reading accounts or looking at pictures of objects most familiar to us in reality.

The omnibus is a four-wheeled coach, with seats along the sides, and a door behind. The reason of this arrangement is, that, an omnibus being intended to take up and set down passengers frequently, there is necessarily, in the use of it, a great deal of getting in and out. The omnibus is so contrived, therefore, as to facilitate this getting in and out, even at a sacrifice, in some measure, of the comfort of the people while in. In a stage-coach, on the other hand, which is intended to convey people on long journeys, so that most of the company can get in together at the beginning of a journey, and get out together at the end, the arrangements of the vehicle are made to secure the greatest comfort of the people while riding, even at the sacrifice of convenience in getting in and out.

Picture of the omnibus.

The strap.

Management of it.



THE OMNIBUS.

The doors in the stage-coach are at the sides, between the wheels, and the steps are necessarily small; but the company usually sit *square*, and the most of them with their faces to the horses. In the omnibus, on the other hand, the door is behind, where no wheels are in the way, and there

is room for broad steps, by means of which the passengers can ascend and descend easily and safely.

Into this omnibus a gentleman is just about to enter. He holds the door open. The driver has released the strap to allow him to do so; for there is a leather strap attached to the upper edge of the door, whence it passes along the top of the omnibus, and out through an opening in front, and thence, passing down by the side of the driver, the end of it is fastened to the edge of the platform on which the driver puts his feet. The strap is made of such a length that the driver, by twisting his foot and ankle about it in a peculiar way, and pressing his foot upon a part of it, near the extremity, can pull the omnibus door to, and hold it close, and

The pay-hole.

The seats.

Windows in front.

then, by untwisting his foot, can release the door, so that the passenger can open it.

Accordingly, when a passenger in the omnibus wishes to get out, he pulls the strap, taking hold of it where it passes along under the roof of the omnibus. Sometimes he takes hold of this strap with his hand, and sometimes with the hook of his cane or umbrella.

And when the passenger that wishes to stop is a child too small to reach the strap himself, he asks some gentleman who sits near him to pull it for him. When the strap is pulled, the driver feels the pressure of it about his boot. He stops the horses, and, turning round, puts his hand into the pay-hôle to receive the sixpence which is due him for the fare. As soon as he gets the sixpence, he untwists his foot from the strap, and thus the door is released, so that the passenger can open it and get out.

The seats of the omnibus are on each side of the vehicle, so that the passengers, as seen in the engraving, sit facing each other. Besides the windows on the sides, there are two windows in front, at the ends of the seats, so that those who sit in the front corners can look out under the driver's seat, and along the street where they are going. Children, accordingly, when they ride in an omnibus, always like to get these corner seats. When they can not get them, they often turn round and kneel upon the cushion so as to look out of the omnibus at the side. It is an endless source of interest and pleasure to them, while riding in this way, to look into the shops and stores as they pass along, and to watch the crowds of people moving on the sidewalk, and the carts and carriages which pass them in the street.

The way they pay.

The change-box.

Boy on behind.

There is a small round hole in the front of the omnibus, directly behind the driver's seat, called a pay-hole. The passengers, as has already been said, put their money up through this hole to pay their fare. The driver looks down through this hole, too, into the omnibus, to see the people get in and out. He is looking down through it now, in the engraving, to see the gentleman get in who stands at the door. The pay-hole is so high that the children can not reach it very well, and, accordingly, they, in paying, usually give the money to some gentleman near, who hands it up for them. Sometimes, in passing up the sixpence, the money drops out of their hands, and falls down upon the floor of the omnibus. In the winter, the floor of the omnibus is covered with straw, and when a sixpence drops among the straw it is almost impossible to find it again. Then, if the passenger is some poor woman, or little girl who has not another sixpence, she is in great trouble.

The driver keeps his money in a small tin box, called a change-box, which is placed very near the pay-hole on the outside. There is a lid to cover this box to keep out the snow and rain. The boys in the streets of New York are very fond of getting on behind the omnibuses to steal a ride. In such cases, whenever the omnibus stops, they are afraid the driver will see them when he turns round to look through the pay-hole to take the pay. They accordingly jump off the steps very suddenly, and crouch down on one side of the door, where they think the driver can not see them. One of these boys is hiding himself in this manner in the engraving.

The name of the street through which the omnibus goes is painted in large letters along the side of the omnibus near the

Lafayette chooses a picture of an Arab on a mule.

top. Many of them are ornamented, also, with pictures of landscapes, and with figures of men and animals, on the panels of the doors.

STUDY XXV.

THE ARAB MULETEER.

"It seems to me it is a pretty small horse," said Lucinda, while she looked at the drawing which her brother had selected, as related in the last Study but one.

"I don't believe it is a horse," she added. "It is a donkey."

"It is too large for a donkey," replied Lafayette. "I think, perhaps, it is a mule."

Lafayette was right in this conjecture. The engraving represented an Arab mounted on a mule. A mule is an animal intermediate in nature and in appearance between a donkey and a horse.

The Arab was seated on the mule, with his back toward the observer. He was dressed in the Oriental costume. He wore a turban on his head, a girdle formed of a sash around his waist, and pointed shoes on his feet. He carried his gun, which was of a very rude and simple form, on the saddle before him; the stock, with the lock, was seen on one side, and the muzzle on the other. He held a pipe to his mouth with his right hand. The pipe had a very long stem. The bowl, at one end, was nearly round, and the smoke was seen issuing from the man's mouth at the other end of it.

Picture of the muleteer.A plan recommended to the reader.

"Now," said Lafayette, "I am going to proceed regularly. First, I shall divide my page into four squares, and then make one drawing in each square."



LAFAYETTE'S LESSON

This was an excellent plan, and I advise all my readers, if they attempt to make drawings in a book on the principles here recom-

Importance of a good arrangement of the work.

mended, that they should take pains to arrange their work well on the several pages of their book, or on the several sheets of paper, if they draw on separate sheets. You may divide the paper into squares by ruling actual lines, or you may only *imagine* such lines, and make every separate drawing in the middle of the space which would be marked out for it if the lines were drawn. In this way, the whole page or sheet, whichever it may be, will, when it is filled, present a systematic and symmetrical appearance, which will be much more satisfactory than if the drawings were made irregularly upon the paper, without order or design. The precise character of the arrangement may very properly vary in different cases. Sometimes you will, perhaps, put a large drawing on the top of the page, and two small ones below ; at other times you will put a large drawing in the middle of the page, with small ones all around it ; and again, you may, perhaps, cover the page with small drawings, arranging them in rows, or grouping them in any other systematic manner. All that is necessary is that there should be some system of arrangement, so that, when you look at the page after it is full, it may appear that, in filling it, you worked upon some determined plan.

There is another important thing to be attended to, and that is, that you must always have a margin of white paper all around the page on which you are writing or drawing. If you look at a page in any printed book, you will see that the words do not extend out to the edge of the paper, but that there is a space left white all around. This space is called the *margin*, and no word of the printed matter, nor any line of an engraving, is ever allowed to encroach upon it. The preservation of this margin is considered

Margin always necessary.Lafayette attempts to copy his lesson.

quite essential to the beauty of the page. In large and costly engravings, the margin is considered still more important even than it is in books, and it is, accordingly, sometimes made quite wide, and very smooth and white paper is selected to print the picture upon, partly in order that the margin may show a very pure and unsullied surface.

Now there is the same reason for leaving a margin when you make drawings with a pen or pencil, that there is in the case of books or of printed engravings. Remember this, therefore, and in no ordinary case allow your drawings to approach, in any part, nearer than within half an inch of the margin of the paper.

As soon as Lafayette had divided his page into squares, he began to draw the figure of the horseman in the upper square on the left hand. He had scarcely made a beginning, however, before he concluded that it would be better to have a house, or a landscape, or some other simple subject, for the first and second drawings in his book, and make the horseman for the third. So he rubbed out the beginning which he had made in the upper square, and began again in the left hand lower square.

He began first to draw the cap or turban of the horseman, and from that he proceeded to the shoulders, and then to the arm, and so on down the back, drawing each part in succession as he came to it. This, however, is not really the proper way of proceeding. The first thing to be done, in making such a drawing as this, is, indeed, to draw slightly the upper line of the head, in order to determine the place where the head is to come; but the next thing properly is to go to the other extremity of the figure, and make touches upon the paper to denote the places for the horse's feet, so

He falls into a very unexpected difficulty.

as to get the whole length of the figure properly represented on the paper. Then the points representing the extremities of the toes should be marked, and the line of the sash around the man's waist, and of the back of the saddle. These points and lines being all fixed first carefully, and marked on the drawing paper at the right relative distance from each other, the intermediate parts can all be put in quite easily; and the whole drawing will be much more correct if executed in this way, than if the pupil begins at one part of the figure, and proceeds, without any thing to guide him as to its general form, by a regular progress, to the other end.

In making any drawing, then, if you wish to get the true form of your figure in the most sure and easy manner, touch first all the most important lines and points, especially those of the extremities, and then you can easily see how the intermediate and connecting parts are to be delineated.

Lafayette neglected this, and the consequence was, that, by the time he had got to the middle of the horse's tail, which, as you will see by the engraving, was rather a long one, he had got off the paper.

"Dear me!" said he, "now my paper is not long enough!"

Lucinda looked at the half-finished horseman with a countenance expressive of great concern.

"It's too hard," said she. "It is a great deal too hard a lesson. You must try something easier. I found a picture over here, a few pages, of a bird standing up on his hind legs."

"His hind legs!" repeated Lafayette, in a tone of contempt. "A bird has not got any hind legs."

"Yes," said Lucinda. "Turn over, and I will show you."

The penguin.

Lucinda's idea of it.

Lafayette fails again.

STUDY XXVI.

THE PENGUIN.

THE picture that Lucinda found for Lafayette was this.



LUCINDA'S BIRD.

"There," said she, "is not that a bird standing up on his hind legs?"

"Oh, that is a penguin," said Lafayette, "or some such bird. They generally stand up in that manner. That is a very good thing for me to draw."

So Lafayette began to draw the bird. He, however, had begun by this time to be a little tired, and somewhat discouraged, moreover, and was consequently not prepared to exercise the necessary care in proceeding with his work. Accordingly, after making a few strokes in a rapid and careless

manner, and finding that he was not going to succeed, he scribbled over what he had begun, and gave up.

"Oh Lafayette!" exclaimed Lucinda, "now you have spoiled it."

Description of the picture.

End of Lafayette's experiment.

"No," said Lafayette, "it was good for nothing before. I am not going to draw any more now. I don't feel like it. I never *can* draw when I don't feel like it."

The bird which Lucinda chose for Lafayette's drawing lesson stands, as is seen in the engraving, on the sand, in a marshy place, with flags in the background growing out of the water. It has web feet, and a broad bill fitted for dabbling in the mud. It has a ring of feathers about its neck, and two tufts, like ears, upon its head. Its neck is slightly curved, and its body appears very long on account of its legs being entirely enveloped by the feathers of its tail. It stands in a very erect posture, with its breast toward the spectator. In the distance is another bird of the same species, with its *back* toward the spectator. By introducing this other figure, the artist has admirably contrived to show the appearance of both sides of the bird.

This subject formed thus a very simple and suitable lesson for Lafayette to practice upon, if he had been disposed to undertake it, and to work upon it half an hour in a patient and careful manner. But he was not so disposed. He did not "feel like it," he said. So he shut up his books and went away, leaving his books upon the desk. The next morning, the servant-girl, who came to put the room in order, placed the books on a shelf in the closet, where they remained a fortnight without being disturbed. At the end of that time, some new arrangements were made in the closet, and the books were put away upon a high shelf, in a corner, and there they remain to this day.

In a subsequent study I shall have occasion to give an account of the efforts which a boy named Daniel Hunter, who lived in a

Description of the group at the cottage door.

log cabin in the woods, made, to learn to draw, and you will find that his experience was very different from that of the Lafayette Place young gentleman.

STUDY XXVII.

THE COTTAGE DOOR.

On the following page we have an engraving of a group before a cottage door. Observe how prettily the artist has arranged the figures.

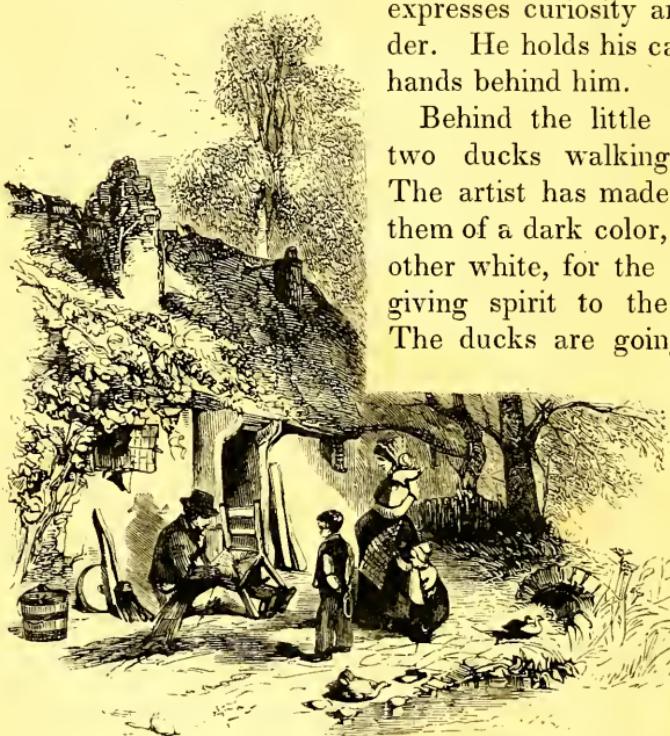
Seated on the ground, by the side of the door, is a man weaving a seat of flags for a chair which he holds before him. The bundle of flags from which he works lies in his lap. A young girl, who seems, by her dress and her air, to be a nursery-maid, stands before him, looking on to see him at work. She has two children under her charge. One is an infant, who has gone to sleep while she has been carrying him, and he now lies in an attitude of repose, with his head upon her neck, and his arm around her shoulder. At her side stands a little girl, holding by her apron, and shrinking back, as if she were afraid to go too near to the chair-mender. Observe how well her timidity is expressed by the attitude in which she stands. She has a cap upon her head, which, though very fully represented, is drawn by the artist by means of very few lines.

The boy who stands near is much older than the girl, and is, accordingly, less afraid. And yet there is a certain air of reserve expressed in his attitude and position, as if he was not acquaint-

Picture of the man mending chair-bottoms.

ed with the man who is weaving the chair bottom, and did not like to go too near him. He stands in an attitude which indicates that he is paying close attention to the work, and there is something even in the manner in which he holds his head that expresses curiosity and wonder. He holds his cap in his hands behind him.

Behind the little girl are two ducks walking away. The artist has made one of them of a dark color, and the other white, for the sake of giving spirit to the group. The ducks are going down



HE IS MENDING A CHAIR.

among the flags and rushes, to the bank of a little brook. Beyond them is seen the masonry of a small arch, through which the

Various observations.

The shadows.

Effects of them.

water of the brook runs. The water is seen plainly in the front of the picture on the right, with loose stones lying on the ground upon the margin of it.

Observe how these stones are made to appear to project above the ground, by means of the shadows to the left of them. Two of the stones lie so near the margin of the brook that the forms of them are reflected very beautifully in the water.

The cottage is of a picturesque and rustic form. The thatched roof is covered with moss, and a vine, growing up from the ground by a large stem seen near the corner of the cottage, runs along the eaves, and half envelops the latticed window. The casement of the window is made to turn upon hinges instead of sliding up and down, and it is open. Beneath the window, a broom stands leaning against the wall of the cottage, with its shadow projected partly upon the wall, and partly upon the side of a grindstone which stands behind it. This shadow, as the artist has drawn it, has a very beautiful effect. Indeed, it is not very improbable that he placed the broom and the grindstone there mainly for the sake of this shadow. How plainly it shows, by its distinctness, that the sun is shining!

The shadow of the man, too, is cast very distinctly upon the wall of the cottage behind him. We see his shoulders and his hat, and even the pipe that he is smoking.

Near, in the foreground on the left, is a pail, with its hoops very distinctly and beautifully represented.

The cottage has a very retired and rural air. It is gradually going to decay. There is a break in the wall under the sill of the window, and the chimney is dilapidated and in ruins.

Some account of Daniel Hunter.

The room in the log cabin.

Beyond the cottage we see the tops of tall trees, and birds beyond the trees, in the air, so remote that we can scarcely discern their forms.

STUDY XXVIII.

D A N I E L H U N T E R .

THERE was once a boy named Daniel Hunter. He had two aunts, who lived together in a log house among the mountains. At length one of his aunts died, and the other was left alone.

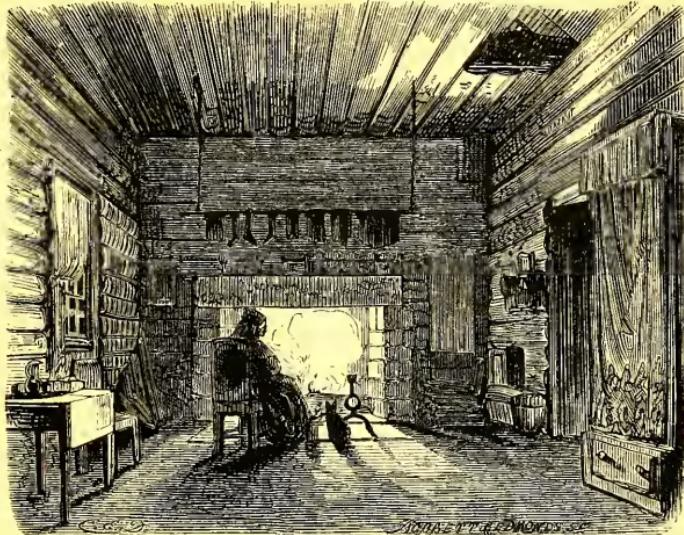
One evening, as this surviving aunt sat in her chair before the fire in her log house, thinking how lonesome it was for her in her cottage now that her sister was gone, she concluded that she would send to her brother, Mr. Hunter, who lived about two miles away, and ask him to let Daniel come and live with her.

Opposite is an engraving representing the lonely woman sitting before her fire. Her cat, the only living thing now remaining with her in the house, sits beside her. We see the shadow of the cat and of the andiron projected upon the floor of the room. We see only one of the andirons. The other is concealed behind the woman. The andiron is of the kind called a *dog*. It looks like a man standing, with his hands upon his hips, and his feet astride.

The room itself, and the furniture which it contains, are very plain and simple. We see the forms of the logs of which the house is built along the walls. The lines of these logs on the sides of the room, and on the ceiling above, are all drawn converg-

Picture of Daniel Hunter's aunt in her solitude.

ing to a certain point, which the artist made as a guide to enable him to draw the lines correctly. This point was made near the centre of the picture, and was afterward erased when the logs were drawn. Such a point is called the point of sight.*



ALL ALONE.

An artist, when drawing any subject like this which contains receding lines, always fixes upon a place for the point of sight, and makes a very fine cross there with his pencil to mark it, and then draws all the receding lines toward it. The little cross serves him for a guide. He draws all the receding lines directly toward it. If there are many of these lines, or if they are straight and long,

* The reason why such lines appear to converge in this manner as they recede, is explained, you will recollect, in Study XXII.

Management of the point of sight.

Position of it.

he lays down a rule, and with the point of his pencil he touches the direction of the line along upon the paper, and afterward draws the line itself properly with his hand. He does not, in ordinary cases, actually rule the line itself, as a ruled line has what is called a stiff and hard character, and is unsuitable for a drawing. He accordingly touches his pencil slightly here and there along the edge of the rule, to determine the position and direction of the line, and afterward draws it properly by hand.

After the artist has drawn all the receding lines, he has no longer any need of the point of sight, and so he rubs out the little cross which he had made to denote its position, since, if he were to leave it there, it would mar the beauty of the picture.

We can always ascertain precisely where the point of sight was marked by the artist in such a drawing as this, by observing to what point in the background the lines on the different sides of the drawings converge. The point of sight in this drawing is within the fireplace, at a very short distance to the right of the woman's chin. The point was erased by the artist after he had finished the drawing, for the little cross, if it had been left there in the midst of the white surface formed by the light of the fire, as I have already said, would have been a blemish in the picture.

The position of the point of sight is a matter of discretion with the artist. He can place it more or less to the right or to the left, and also higher or lower, as he pleases. Wherever it is placed, the receding lines must all converge toward it. The result will be that the room will appear somewhat different, according as the point of sight is placed in different positions—as if the room were looked at from different points of view. The artist always places

Receding lines.

The lines of the floor.

Importance of the principle.

his point of sight where he supposes it will bring the room into view in a manner most suitable to his purpose. But he must determine upon a place for it somewhere, else he would have no guide for the drawing of the receding lines.

It is only lines that *recede* from the spectator in a view that must be drawn converging to the point of sight. Those that pass *across the field of view*, and all those which *stand upright*, do not converge at all. Thus the lines of the logs or planks that appear in the farther side of the room, where the fireplace is situated, pass directly across the field of view. They do not recede at all. The left-hand end of any one of those lines is just as far from us as the right-hand end. Thus those lines are not to be drawn converging to the point of sight. They are to be drawn straight across in their natural position.

In the same manner, if the floor of the room, instead of presenting, as it does, one smooth, continuous surface, had been formed of boards, and if the boards had been laid crosswise, that is, from left to right, in such a manner as that the lines between them should have passed across the field of view instead of receding from the eye, then they would have been drawn parallel to each other, across the paper, in their natural position. If, on the other hand, the boards had been laid lengthwise of the floor, so that the lines between them should extend from the foreground back toward the fireplace, these lines, being receding lines, would necessarily appear in the drawing to converge toward the point of sight.

This principle, when you once understand it, will guide you in drawing furniture as well as rooms; for in furniture, as well as in the walls and ceiling of a room, all lines that recede from the

Further illustrations.

Description of the furniture of the room.

spectator must tend to the point of sight, while those that are perpendicular, or which pass square across from left to right, must be drawn in their natural position.

Look, for example, at the table which stands in the corner of the room nearest the spectator, on the left. The end of the table, which is turned toward us, stands square to the view, and is drawn just as it is. The legs of the table, too, which are perpendicular in fact, are made perpendicular in the drawing, and parallel to each other. But all the lines which run along the table from one end to the other, being receding lines, must tend toward the point of sight, and thus must converge toward each other.

But to return to the story.

The furniture of the room is exceedingly simple and plain. There are but two chairs. The woman sits in one. The other is placed back against the wall, under the window at the end of the table. On the other side of the room, in the corner near the fire, is a sort of chest, with some other simple articles near it. A roller-towel hangs against the wall, by the side of the fire. Near the foreground, on the right, is a bedstead, turned up against the wall, and covered with a curtain. There is a drawer below to contain the bedclothes when the bed is turned up by day. At night these bedclothes are taken out, the bedstead is let down to the floor, and the bed is made up. The bedstead is constructed in this way because there is no other room for a bed in the house, and by being turned up into its place against the wall in the day time, it is out of the way.

Daniel Hunter went to live with his aunt. The day he went away from home his father said to him,

Daniel's mode of life at his aunt's.His amusements.

"Now, Daniel, my boy, you are ten years old ; you are old enough to earn your living well. I hope you will do your best to do it. I should be ashamed to have a boy of mine live in any house besides his father's where he did not earn his living."

Mr. Hunter was a farmer, and David had been accustomed to work, and he was a very capable boy. As soon as he got settled at his aunt's, he began to work very regularly, day after day, in order that he might, as his father said, earn his living.

There was a little garden near the house, where his aunt was accustomed to raise such vegetables as she required, and there was a pasture behind it where she kept her cow. Daniel, as soon as he came to the house, undertook the whole care and cultivation of this garden, all except the first plowing of it in the spring.

But it was not about Daniel's work that I was going to write here, but about his drawing. He, of course, had very few amusements and very few companions. He had scarcely any books, and no playthings ; and though he used sometimes to go home to his father's to make a visit in the winter evenings, still he usually remained with his aunt, because he did not like to leave her alone. Now some boys might suppose that with few books, and no playthings, and no companion but his aunt, Daniel's time, in the winter evenings, would often hang heavy on his hands ; but it was not so. He had many ways of occupying and amusing himself. One of his plans was learning to draw. It is only for the purpose of explaining how he managed in this attempt that I have brought Daniel Hunter to view at all in this book, and I shall accordingly tell what he did in the next Study.

Before I begin, however, upon that subject, I wish to tell you

The garret where Daniel slept.

A dark place.

where Daniel slept. Look back at the engraving of his aunt's cottage. You will see in the ceiling overhead, near the middle of the right-hand side of the room, a square hole leading to a dark place above. The place that this hole leads to is a sort of garret. Daniel's bed was in this garret. He used to go up to it by means of a ladder.

The hole leading to the garret is situated, as you will observe, near the door. Daniel used to keep his ladder just outside the door, in a little shed which was built there, and which covered the entrance way to the door. When bedtime came Daniel used to go out and bring his ladder in. He would then set it under the hole, or trap-door, as he called it, resting one end of the ladder on the floor toward the fireplace, and planting the other end firmly against the margin of the opening. Then he would bid his aunt good-night, and begin to ascend the ladder. When he reached the top, he would push open the scuttle-door which closed the opening, and then climb up. It was somewhat inconvenient to Daniel to have such a door there to lift up every time he went up to his bed, but he submitted to this inconvenience very cheerfully, since he knew that it was necessary to have the opening closed, in order to prevent the cold wind from coming down into the room below. Daniel would have liked very well to have had the trap-door open at night while he was up there; but he knew that it was particularly necessary to have it closed at night, for the opening being nearly over the place where the bed stood in the room below, the wind, if the trap-door had been open, would have blown directly upon his aunt while she was asleep.

Accordingly, as soon as Daniel got up through the hole, he

The window.

Moonlight.

Stormy nights.

Going to sleep.

used to shut down the door and go toward the corner where his bed was. He knew which way to go by the window. There was a small window in the end of the garret, near the head of his bed, and the light of this window guided him. Sometimes, especially when it was cloudy or stormy, very little light came in, and then Daniel was obliged to undress himself almost entirely in the dark. This did not happen, however, very often. Generally, there was as much light as Daniel desired; and sometimes, when the moon was full, and the sky was clear, Daniel's little apartment was lighted up by her beams in quite a brilliant manner.

At such times Daniel would amuse himself for a little while after he went to bed in looking at the image of the window formed by the moonbeams on the under side of the roof opposite to him, observing how curiously this window was elongated by the slope of the roof, and watching the changes which took place in its position and form. Musing upon this spectrum was an endless source of pleasure to him on pleasant nights, when the rising moon was full. In storms, on the other hand, he experienced a feeling of enjoyment almost as great—though it came to him through a different sense—in listening to the roaring of the wind among the trees, and to the pattering of the drops of rain upon the roof directly over his head, or the clicking of the snow or hail against his window. There was one respect, in fact, in which the pleasure of hearing these sounds was superior to that of seeing the reflected image of light, for it remained with him longer as he gradually sank to sleep. The bright image was, of course, shut out from his sensorium from the moment that he became sleepy enough to close his eyes; but the sound of the wind and the rain.

Daniel wishes that he had a pencil.

He resolves to make one.

on the nights when he heard them, continued to lull his senses long after his eyes were closed, and were the last traces of consciousness to leave him. They seemed to him like friends coming into his mind to soothe him to sleep, and, after sending all other thoughts away that could tend to disturb him, retiring gently themselves at last, at the instant when he was sinking to slumber.

STUDY XXIX.

THE HERON.

“If I only had a pencil,” said Daniel Hunter, one evening, to his aunt, as he was sitting with her by the side of the fire, “I could learn to draw.”

Daniel’s aunt was knitting at this time, as she sat in her chair by the chimney corner, and she happened just at that moment to be lost in a dreamy reverie, thinking of old times, so that she did not hear, or rather did not observe what Daniel said.

“There are some very good pictures in the Almanac,” said Daniel, “which I could copy.” He said this in a musing sort of tone, as if he were talking to himself rather than to his aunt.

“I wish I had a pencil,” said he. “Do you think you have a pencil in the house, aunt?” he added.

“No,” said his aunt; “but there is a small piece of lead out on a shelf in the porch, and perhaps you can make one.”

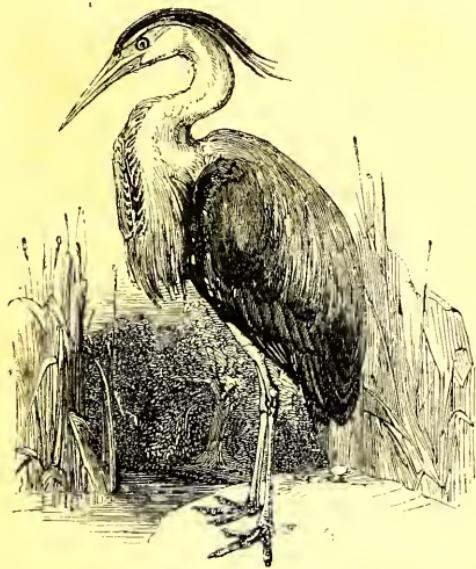
“So I will,” said Daniel.

He resolved that he would make a pencil the next day; and, in the mean time, he would take out the Almanac from the chest

He chooses a picture for a drawing lesson.

between the door and the fire, where it was usually kept, and choose something to draw.

He determined to choose something simple for his first lesson; and so, after turning over the leaves of the Almanac, and looking at all the pictures which were in it, he decided at length upon this picture of a heron.



THE HERON.

He carried the Almanac to his aunt to show her the picture.

But his aunt said she could not see it without her spectacles, and her spectacles were not then at hand.

"But you can tell me about it," said she. "Look at the picture, and tell me."

"I see a curious tuft on his head," said Daniel.

"A tuft of feathers, is it?" asked his aunt.

"Yes," said Daniel; "of very fine, slender feathers."

"Do you think you can

draw such feathers as those?" asked his aunt.

"Yes," said Daniel. "They begin at the end of his bill, and go over his head in a round, and then the ends stand off from the back of his neck. The ends of them," he continued, "are exactly over his feet, in a line with his legs."

Daniel studies his model.

His guide-line.

Conversation.

"Are they?" said his aunt.

"Yes," said Daniel. "He has not any feet—nothing but toes. Where his legs end, his toes begin. He has four toes, three in front and one behind. His legs go up almost exactly straight to his knees, and then his thighs lean forward a little. If I draw a line straight up from his legs through his body, it would just touch the end of his tuft of feathers. I mean to draw such a line on my paper, and that will show me how to draw his legs, and where the end of his tuft would come. It will be my guide-line."

Daniel went on in this manner, examining his picture carefully in every part, and noting the relation which one part bore to another. He observed that the body of the bird was shaped almost exactly like an egg, or, to speak more scientifically, was of an oval form, only that the feathers of the ends of the wings and of the tail projected downward at the end, in two rounded points. The broadest part of this oval was above, where the upper part of the wing came. Daniel studied the size and position of this oval very carefully.

"About half of it," said he to himself, "will be to the left of my guide-line, and half to the right."

So he determined that, as soon as he should have drawn his guide-line, he would sketch faintly the form of an oval upon it, or rather across it, in an oblique position, corresponding to the position of the body of the bird. This would give him the general form of the body of the bird, and he could afterward add the two rounded points for the ends of the wings.

"His neck is curled into a ring, aunt," said Daniel; "almost a

Daniel proceeds in a very scientific manner.

round ring, only it does not go entirely round. There is an open place under his bill ; but from the end of his bill, round over the top of his head, under the tuft of feathers, and so down the back of his neck, it makes three quarters of a circle. I'll draw a faint circle of the right size just where it ought to come in my drawing, and then I can draw his head and neck by that."

In this manner Daniel went on examining his model for more than half an hour, and at the end of that time he understood the form of the bird very fully, and could almost have drawn it from memory. His plan of imagining an oval to be drawn for the body, and a circle for the head and neck, and of a guide-line to show the position of the legs and of the end of the tuft of feathers, was a very excellent one. Professed draughtsmer, when they are drawing irregular forms of this kind, always derive great assistance from referring the different parts to guide-lines and to geometrical figures which they imagine to be drawn within or around them. Daniel himself was aided very much indeed, in drawing his heron correctly, by means of these devices, as will appear in the sequel.

The next morning, Daniel found the lead which his aunt had spoken of, on the shelf in the porch. As soon as he had got it, he went out into the shop, and with his knife he cut a groove in a block of wood for a mould to cast the lead in, to make his pencil. This groove was about three inches long, and the two sides of it sloped toward each other, so as to meet together at the bottom. Thus the bar of lead, when cast, would be of a triangular form. The upper surface would form one side, and the two sides of the groove in the wood would form the other two sides.

Daniel casts a pencil.

The process.

Substitute for paper.

“How are you getting along?” said his aunt to him, when he brought the mould into the house.

“Well!” said Daniel; “very well! I have got the mould done.”

“Let me see,” said his aunt.

So Daniel gave his aunt the block of wood, and showed her the groove in it.

“Yes,” said she; “but you have made the ends of the groove square. I advise you to bring one of the ends to a point, and then your pencil will be already sharpened.”

“Yes,” said Daniel, “that will be an excellent plan.”

So he cut away the wood at one end of his groove in such a manner as to form it to a point. Then he melted his lead on the fire-shovel, and putting the block of wood down upon the hearth, he poured the melted metal carefully into the groove until it was full.

He let the casting remain where it was until it was cold, and then he pried it out with the blade of his jack-knife. After examining it carefully on every side, and finding that it was perfect, he placed it between his fingers in the manner in which a pencil should be held in making a drawing, and began to make traces upon the smooth surface of the block of wood.

“Yes, aunt,” said he, “it will draw very well.”

“And now, what will you have to draw upon?” asked his aunt.
“Have you got any paper?”

“No,” said Daniel. “I don’t need any paper. I have got something else that will do very well.”

“What is it?” asked his aunt.

Daniel begins his work.

He succeeds remarkably well.

"Some shingles," replied Daniel. "There are plenty of shingles in the barn, and I have chosen out two or three that are broad, and very smooth, and I can draw on them very well."

"Yes," said his aunt, "I should think that they would be excellent to draw upon."

Daniel brought in one of his shingles that evening, and commenced his drawing. He examined his model anew before he began to copy it, studying it with special reference to the direction and length of his guide-line, and to the position and size of his oval for the body of the bird, and of his circle for the curve of the head and neck. Then he carefully sketched the guide-line, and the oval and circle, on his shingle, toward the upper left-hand corner of it, taking care to get them in the same relative positions, as nearly as possible, as the imaginary ones in the model. This enabled him to draw the great leading features of the model in a very correct manner, after which, it was comparatively easy to put in the other details, such as the bill, the eye, the feathers on the breast, the tips of the wings, and the toes standing on the ground. Finally, when his work was done, he found that he had delineated the form of the heron very correctly indeed.

In the same manner, Daniel made copies of other pictures, from time to time, until, in the course of the winter, he had filled five shingles with drawings; and, as he arranged his several lessons on the shingles in a neat and systematic manner, the whole had a very pretty effect. In doing this work, he studied the forms of his models so thoroughly, that he afterward carried them in his mind, and could draw them very well from memory.

By comparing the case of Daniel with that of Lafayette, we see

Wild geese swimming in a pond.

Flock in the air.

that, in point of enabling one to learn to draw, the habit of careful and attentive study, with a view to understanding, beforehand, what one is to do, and of patient and persevering industry in doing it, is of more value than the most expensive set of drawing books and of drawing materials that can be bought in New York.

STUDY XXX.

THE WILD GEESE.

WE have, on the opposite page, an engraving which illustrates an important principle in perspective, which is, that the more remote an object is, the smaller it appears.

In the foreground are some wild geese swimming in a pond. The water is shallow, as we know from the flags and bulrushes that grow in it. In the middle distance, on the right, is a heron standing among the flags. We see by his feet that the water is very shallow where he stands. His legs are very long, so that he can wade where the water is much deeper than it is at the place where he is now standing. The water is pretty deep in the middle of the pond. At least we presume so, for there the flags and bulrushes do not grow.

The geese have no occasion to wade. They can swim. Four of them are now swimming in the water in the foreground, though one is just spreading his wings to fly.

Besides these four that are swimming upon the water, there are five more geese belonging to the same flock in the air. They were swimming on the water a few minutes ago, in a long line.

Picture.

A principle of perspective.

Order of flight.

The leader of the line, for some reason or other, concluded to fly away. All the rest then immediately resolved to follow. They rose one after another, in succession, from the water, until five are on the wing, and the sixth is just rising. The seventh, eighth, and ninth are looking up, preparing to rise too as soon as their



THE WILD GEESE FLYING.

turn comes. Then the whole flock will soar away through the air in a long line, wherever the leader conducts them.

The leader—that is, the first and most distant one in the line—looks quite small. The next one—that is, the one that comes immediately after him—appears a little larger, the next larger still, and so on in succession, until we come to those that are nearest to us, swimming on the water of the pond, which are the largest of all. They are all really of the same size, but they appear larger or smaller according as they are nearer or more remote from the observer.

It is always so with objects seen in perspective.

In the sky, over the middle of the picture, is another large

Wild geese are birds of passage.Their habits.

flock of geese flying, as wild geese very frequently do, in two lines which meet in a point. The leader of the flock is at the point where the two lines meet.

We know that this double flock are flying away from us, and not coming toward us, from the fact that the geese that are toward the end of the lines where they meet in a point, and where the leader is, appear smaller than those at the other end. Of course, that end of the line is more remote from us. The flock are rising into the air, and going away at the same time. The flock is a very large one. The number of geese in it is so great that it would be very difficult to count them.

Wild geese are birds of passage—that is, they do not live all the year in one country. In the summer they go far to the north, and build their nests and seek their food in the lakes and ponds which they find in lonely places there, where there is no one to molest or disturb them. At that season, these ponds, though situated in northern climes, form very pleasant habitations for them. The waters are warm, the banks of the pond are green, the margins are fringed with flags and bulrushes, and the warm sun shines pleasantly into all the little inlets, creeks, and coves. Here they build their nests. Here they wade, and swim, and seek their food, leading their young goslings with them as soon as they are hatched. They pass the summer here, and then, when they find the winter is coming on, they assemble in immense flocks, and under the guidance of their leader they soar into the air to a vast height, and set out on their journey to the southward.

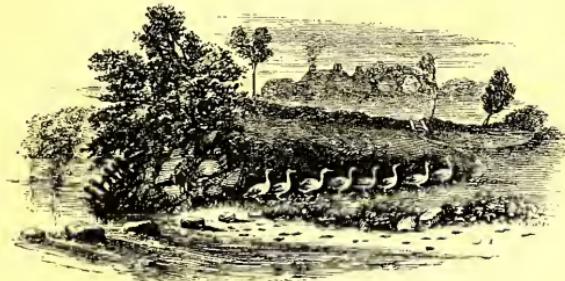
They always have a leader, but by what means they determine which of all the flock shall be the leader, nobody knows.

They fly to vast distances from north to south.

In their passage to the southward they soar into the air to a vast height, and then fly for thousands of miles over states and kingdoms, over forests and mountains, over rivers and broad seas, till they come to the warm regions of the South, where frost and snow never are seen. Here they remain till the winter season at the North is over. While the ponds there, in which they reared their young, are frozen over, and every thing around them is cold, snowy, and desolate, the geese are enjoying themselves in warm and sunny morasses and fens in tropical climes ; and when, at length, the time arrives for the spring to come on in the northern regions, then they go back again as they came.

How they find out when it is time for the spring to come on at the North, nobody knows.

Wild geese always fly in long lines. You can see, in the picture, that those which are in the flock that is rising off from the water are flying away in a line. The large flock, too, is formed in



GEESE ON A MARCH.

two lines meeting in a point. We see the same tendency in the habits of tame geese living in farm-yards. In going out to feed in the morning, and in coming home at night, they march in a line,

following their leader wherever he goes, and walking with an air of great dignity and solemnity. They walk thus all the way in single column, each bird keeping his place exactly behind his

Habit of geese of moving in lines.

The wagon.

predecessor, in regular succession, like a file of men marching under a corporal to relieve a guard. Thus there seems to be some curious and mysterious propensity inherent in the nature of the goose, leading them all, whether wild or tame, to move in this manner when going in company from place to place. This is the more remarkable, as we do not observe any such propensity in other animals. Hens do not do so ; neither do sheep, nor horses, nor cows, though they often go in company and in concert, from one place to another, following a leader. Ducks, however, form lines like geese, and the nature of the duck is, in other respects, similar to that of the goose. On the whole, we conclude that there must be some reason, arising out of the wants and necessities of such animals as the goose, or out of the dangers to which they are exposed, which has caused them to be provided with such instinct, though what this reason is we do not know.

STUDY XXXI.

THE WAGON IN THE SNOW.

In England, in old times, before rail-roads were built, the whole country was traversed by stage-coaches, and also by wagons, for conveying passengers and parcels from place to place. The stage-coaches were the most comfortable, and they went the fastest, but the price was high. Accordingly, only such people as were well supplied with money were accustomed to travel in them, and few parcels were taken except such as were small or of considerable value. The wagons traveled more slowly, and the seats were

The canvas roof.

Mode of representing the flakes of snow.

not so comfortable ; but then they were much cheaper. Thus people who had but little money traveled in wagons, and parcels larger or less valuable than those sent by the stage-coaches were conveyed in them.

The wagons were covered with a canvas roof, to protect the travelers within from wind and rain. The canvas was supported by a frame formed of slender wooden bars, which were carried over from one side to the other, in the form of a semicircle.

The travelers were accustomed to sit on seats that passed across the wagon from one side to the other, under this awning. The driver sat on a seat in front, near the horses.

Over the leaf we have a picture of one of these wagons fast in the snow. There has been a great snow-storm. The storm is, in fact, not yet over, for we see the flakes of snow still falling. We see these flakes only in the dark parts of the picture, for, being white, they can only be represented on a dark ground. Thus they show very plainly against the side of the forward horse, which is a black one, but not against the side of the horse in the shafts, for he is white. The flakes are seen relieved against a dark surface, too, in the figures of some of the people, in the shadows on the ground, in the dark parts of the drawing of the wagon, and in the clouds of the sky.

The wagon is set fast in the snow. Farther back on the road the driver succeeded in getting along without much difficulty, for there the snow lay evenly, and was not very deep. He has, however, now come to a low place, where the snow has been driven in and drifted by the wind, and the horses can not draw the wagon through it. The wheels of the wagon are half buried, and the

Whip-lash lost.

Passengers remonstrating with the wagoner.

horses stand in snow so deep that it comes up above their knees. The man has a long whip-handle in his hand, with which he seems about to whip his horses to urge them on. But they can not go on. The snow is so deep that it is impossible for them to draw the wagon through it.

The man has lost his whip-lash in whipping his horses. The horses look frightened, but they can not move. They stretch out their heads and necks to avoid the blow that they know is impending. It is cruel for the driver to whip his horses when they can not draw the load.

Some of the passengers are remonstrating with the wagoner. There are three that have got out of the wagon and are now standing in the snow. They got out of the wagon in order to lighten it, and so make it easier for the horses to draw it. Two of them are women and one of them is a man. They all have long cloaks on. They look old and poor. One of the women seems to be lame. She walks with a cane, and leans upon it as if it would be difficult for her to walk without it. I should suppose, however, that she can not be very lame, or she would not have got out into the snow.

The man stands behind the two women. He has not only got out himself, but he has taken out his trunk, and opened it on the snow. He opened it, I suppose, to get some warm mittens, or some other article of clothing to protect him from the cold.

The foremost woman is the one who is remonstrating with the wagoner. "Do not whip the poor horses any more," says she. "They can not draw the wagon through all this snow. You must not whip them."

Picture of the wagon in the snow.

So saying, she puts out her arm to arrest the stroke which she



THE WAGON IN THE SNOW.

sees the wagoner about to give to the poor tired leader.

At the place where the woman and the wagoner stand, the snow is not so deep as it is where the wagon and the horses are. The people are standing upon a bank by the road side, while the horses and the wagon are in the

The best thing to be done.

The two women in the wagon.

road. The bank is higher than the road, and so the snow is not so deep there. If the wagoner could get his horses to draw the wagon, with the people that still remain in it, through the deep place, the three passengers that have got out would walk on along the bank, and then get in again. But this will be very difficult. The best way is for the wagoner to make a path before the horses by trampling down the snow with his feet, and then to clear the way for the wheels by trampling down the snow there too, or pushing it out to one side and the other. Such a snow as this wagon is fast in is usually very light, and when it has freshly fallen it is quite easily trampled down or pushed away.

There are two persons still remaining in the wagon. One is a young woman in feeble health. The other is a mother with an infant in her arms. The young woman wishes to get out, and is half disposed to do so, but the mother presses the infant to her bosom, and determines to remain in the wagon at all hazards rather than expose her dear babe in the least degree to the storm.

In the foreground of the picture is a guide-board fastened to a post. The post leans back out of the perpendicular, and the upper edge of the board is so covered with snow that it is difficult to read the inscription.

There are three snow-birds on the snow before the guide-board. They are hopping about in search of something to eat. The food which they find consists of little seeds which remain in the sprigs of grass of the last season that rise, sometimes, here and there, above the snow. There is another snow-bird perched upon the guide-board. In the background are some trees, with their branch-

A pollard.

Meaning of the term.

The log-cabin.

es bare. Those on the left are of their natural forms. They appear to be maples or birches. Those on the right are pollard willows.

A pollard is a tree the main trunk of which has been cut off at a certain distance above the ground, in order that it may throw out numerous new branches. Willows are very often cut down in this manner, and then, when the new branches have grown out, a thick head is formed of limbs spreading out in every direction from the top of a short, thick trunk. Such a tree is called a pollard.

STUDY XXXII.

THE LOG-CABIN.

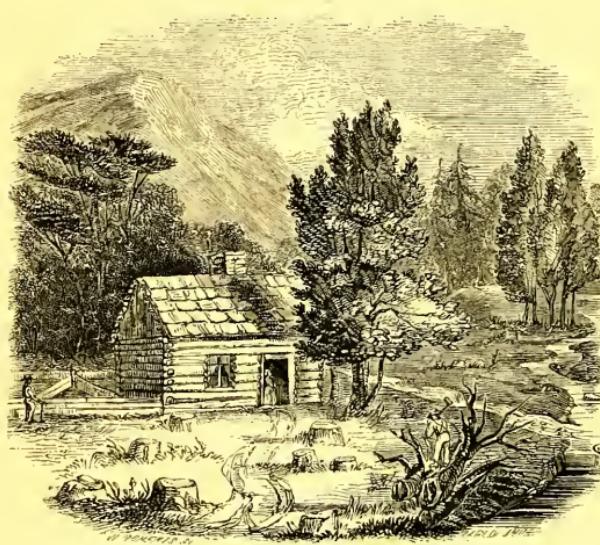
On the next page is a picture of a log-cabin, similar to the one that Daniel Hunter lived in. When men buy themselves farms, far back in the woods, where there are a great many tall trees growing all around them, with straight stems, so that plenty of logs can be obtained easily, and especially if there are no mills built to saw the logs up into timber and boards, they find it easier to build a log-house than any other kind.

On the other hand, in regions that have been long settled, where a large portion of the forest trees have been cut down, and where mills have been built for the purpose of sawing up the logs into timber and boards, there it is much better to build frame-houses. The logs are too valuable to be used whole. If they are sawed up into boards, and put upon a frame, a much smaller number

Mode of constructing a cabin or a house of logs.

will be sufficient than if the house is built by piling them one above another like a wall.

It takes much more wood to build a house of logs than to frame it and cover it with boards; but this, where the trees are plentiful, and grow all around the place where the house is to stand, is of no consequence.



THE LOG-CABIN.

In this picture we see, in the foreground, the stumps of some of the trees which the man cut down to get logs to build his house with. The other trees grew to the left of the house, or behind it in the wood, or else to the right, along the banks of the brooks that you see meandering there.

In building such a house, the logs are piled up, one upon the top of the other, like a wall. The ends of them are crossed at the corners, and notched together there, and this keeps them all in their places. It would not be possible to build a single wall of logs in this manner, for there would be nothing to keep those that were placed above the rest from falling down. But four walls

Mutual support.What is meant by composition.

joined together at the corners may be easily built, for in that case, those which form the two ends keep those which form the sides in their places by being notched into them at the corners. In the same manner, the logs which form the sides keep those which form the ends in their places. Thus, by building four walls in connection with each other, the logs of the end walls and those of the side walls lend each other a mutual support.

In building the house, proper openings are left for a window and a door.

The man who built this house left two or three trees standing by the corner of it, near the door, for ornament and shade.

Behind the house is a very dark wood, and behind the wood a high rocky hill.

STUDY XXXIII.

COMPOSITION.

In looking at pictures of any kind, whether paintings or engravings, the observer should always notice what is called the *composition* of them. By the composition of a design, the artists mean the selection and arrangement of the figures or other objects represented in it. There are certain principles which it is necessary to observe in the composition of a picture, otherwise a bad effect will be produced instead of a good one.

One of these principles is, that there should be a variety in the forms and attitudes of the figures represented, and that they should be grouped in an easy and graceful manner.

The group of reapers.

Art of the designer.

We have in this engraving, for example, a company of reapers in a field of wheat. Observe how much variety the artist has given to the figures, and to the positions in which he has placed



A COMPOSITION.

them. In the foreground, to the left, there is one kneeling upon the ground before a sheaf of wheat which he is binding up. To the right are two other figures. One of them is reaping, the other is

Variety in the forms and the arrangement of the groups.

drinking water from a jug. Thus each of the three principal figures in the foreground is in a different position and attitude from the rest, and, viewed in connection with each other, they form a varied and graceful group. The man who is drinking lifts the jug to his mouth with his right hand, while he holds his sickle behind him in his left. We see the sickle of the other reaper too, as he passes it round the stalks of the grain that he has gathered in his hand. The two sickles, however, are held in such different positions, and present themselves under such different points of view, as to add to the variety.

Observe, too, how varied are the forms and attitudes of the three men. One is standing erect. Another is bending over to his work. The third is kneeling upon the ground. The one who is kneeling has his face toward us. The middle one has his back toward us, and the third his side. The dresses of the two who are standing together are made different too. One wears trowsers coming down to his ankles. In the other, the stockings come up to the knees. In one, the back of the vest is white; in the other it is black. Now all these diversities in the details of the different figures are not accidental, as it might seem, but they were all carefully planned and designed by the artist, to give interest and spirit to his drawing.

In the background are three men reaping. It was necessary that there should be several laborers engaged in cutting down the grain, in order to make the design true to nature; but it would have made the picture monotonous and spiritless to have had these men engaged all in the same employment, and placed as the prominent figures in the foreground, and so the artist has removed

The house in the background.

The hedges.

The trees.

them back where their forms may be smaller, and the effect they produce be somewhat subdued. They are all necessarily engaged in the same work, but the artist has given variety to the group by varying, as much as possible, the attitudes in which the men stand.

Take, now, a general survey of the whole group of laborers—six in all—and see with how much ease and gracefulness the artist has arranged them, so as to make the character and expression of the whole agreeable to the eye.

The form and position of the house in the background, with the hedgerow in front of it, and a group of trees behind, is included in the composition of the picture, and very much of the general effect of the whole depends upon them. It was necessary, in order to give a just representation of a wheat-field, to show a broad expanse of level surface. This the artist has done. If he had, however, drawn nothing more than this, the scene would have been dull and monotonous. So he contrived some tall and dark objects to place in the background, as a relief. He invented a house of a very peculiar form and outline, and gave life and spirit to the drawing of it by putting the roof and all the parts toward the left in shadow, and throwing a strong light upon the end that is turned this way. Behind the house is a grove of trees very gracefully grouped. From the centre, a tall tree rises high above the rest, giving a marked and striking character to the group. The dark stem of this tree, rising from the midst of the other foliage, has a very spirited effect, and the background, contrasting in its character strongly as it does with the level surface of the field, gives great life and spirit to the picture.

What is meant by the composition of a picture.Selecting subjects.

You now understand what is meant by the composition of a picture. It relates to the selection of the figures and objects to be introduced into it, and to the manner in which they are grouped and arranged by the artist, with a view to producing the most agreeable effect.

There are two very great and perfectly distinct advantages to be derived from thus studying the subject of the composition of designs. They are these.

1. It will help you in drawing pictures yourselves.
2. It will help you very much to understand and enjoy the pictures which others have drawn.

STUDY XXXIV.

THE LOAD OF STRAW.

SOMETIMES artists, in making a picture, compose the design themselves, from their own imagination. At other times they simply copy some actual group, or assemblage of objects, which they see in nature. In this last case nature is the composer, and they, in drawing their picture, only copy the composition which she has made for them.

It requires almost as much taste, and skill, and knowledge of the principles of composition, to *select* a good subject from nature, as to design one by the imagination ; for very often the form and manner in which objects are grouped in reality are such that the effect of them would not be good in a drawing. But then, in such cases, by changing the point of view from which they are seen,

The large load of straw.

Contrivances of the artist.

or making some small alterations in the details, the effect will often become good.



THE LOAD OF STRAW

Here, for example, is a view of a very large load of bundles of straw, drawn by two horses, coming along a level road in the country. It is very probable that the artist who made the drawing saw an object of this kind some day, when taking a walk, and that he determined to

make a drawing of it when he reached home. If so, it is to be presumed that in some of the details he varied his drawing from the original view, in order to make it more spirited and picturesque.

The two horses, for example, as you see them in the engraving, are of different colors, the leader being white, and the shaft horse black, or at least of some dark color. It is possible that the actual horses, as the artist saw them, may have been really alike, and that the difference made in them in the drawing may have been an idea of his own, to give spirit and variety to the aspect of the team. In the same manner, the difference in the attitude and position in which we see them may very likely have originated in the imagination of the artist. As he saw them, perhaps, they were walking along, one after the other, precisely alike, whereas in the drawing their positions are varied, so that we have

Various objects introduced by the artist.

The English farm-house.

almost a front view of the leader, and a side view of the one in the shafts.

In the same manner, the two men may have been both upon the ground, walking together by the side of the horses, and the artist, thinking that he would thereby add to the interest of the picture, conceived the idea of putting one of them, with a little dog by his side, upon the top of the load.

There are various other objects introduced into the picture, any or all of which may have been the invention of the artist, such as the gate on the left of the horses, the beautiful elm-tree in the field behind the gate, the road seen winding in the distance across the plain, behind the teamster, who is walking by the wagon, the group of trees and foliage in the foreground, to the right, and the water at the foot of these trees, issuing from under the little arch by the side of the road. All these things add much to the interest of the composition of this picture, but whether Nature or the artist was the composer who arranged them as they are here seen, I do not know.

STUDY XXXV.

GROUPS OF BUILDINGS.

OVER the leaf is a view of the rear of an English farm-house, with the beams of the frame visible in the end of it, according to a mode of building customary in that country. We see the yard of the house, too, with trees on each side. In the centre of the yard, two women are talking together, and a little dog is jumping

Wrong way of proceeding.	Example.	Gable ends.
about near them. To the right is a well, with a roof over it, and a windlass for drawing up the water.		

This view will make an excellent drawing for those who have patience and perseverance enough to proceed properly in drawing it.

The method which new beginners often adopt in drawing such a scene as this, is to commence on one side, and advance regularly toward the other, drawing the several parts of the picture in succession as they proceed. The result is often—as it was in the case of Lafayette Livingston, described in a former study—that they get off the paper before they get half through with the design.

For instance, that was the way that a boy proceeded in drawing this very design. He began with the chimney on the left-hand side of the building. He drew this chimney pretty well, only, as he had nothing to guide him in respect to the size of it, he made it considerably too large. He then began upon the roof of the large gable,* and first drew the slanting line which forms the left-hand side of the roof. Now, as he had nothing to guide him in respect to the slanting of this line, or to the length of it, he made it both too slanting and too long. Then he proceeded to make the slope on the other side of the roof, and as he had nothing to guide him here, he got the slant on this side different from that on the other, so as to make the roof look one-sided. In survey-

* The end of a house, or portico, or other building, which is surmounted by the two edges of the roof meeting at a point in the centre above, is called a *gable* end, the triangular part above being called the *gable*. In this picture there are two gables, a large and a small one. The small one belongs to a sort of portico.

Necessity of first marking boundaries.

ing his work after he had got it done thus far, he saw that there was plainly something wrong in it, but he could not tell exactly what. So he simply rubbed out the right-hand slope of the roof, and drew it again; but as he had nothing to guide him now more than he had before, he did not get it much nearer right. He thought it would answer, however, or, at least, he despaired of making it better, and so he went on. He then drew the small



GABLES.

gable. He made this too wide too, and the roof of it one-sided. Thus he went on; and when at last he got to the end of the house, he found that he was at the end of his paper, and there was no room for the fence or for the well at all.

Now, to guard against these dangers, and to secure having every part of your copy in its proper place, and of its just proportion, you must determine the places of the several important points in your

Finding the centre.

Convenient mode of measuring.

drawing *first*, and make points upon your paper to denote them. These points will serve as guides, and then, when you have drawn the intermediate parts of the design properly between them, all will be right.

Find, for instance, in this picture, the point which comes nearest to the centre of it. I think the centre is as nearly as possible at the lower right-hand corner of the roof of the portico. Fix your eye on that point, and then look up first to the top of the clouds, and then down to the bottom of the ground, and see if the distance is not nearly the same. It is. You can be sure of this by measuring the distances by the edge of a piece of paper which you can lay upon the picture.*

In the same manner, you will see that the distance from this point to the edge of the picture on the left is the same as to the edge of the picture on the right. Thus you will find it to be in the centre, both from left to right, and from top to bottom.

You then make a very fine dot in the centre of your paper, or of that part of it in which your drawing is to be. This will, of course, mark the place where the lower end of this roof-line—that is, the right-hand side of the small gable—is to come.

You then observe that from this point down to the bottom of the portico is just about half way to the lower edge of the picture in the foreground, and you make another dot there for the lower

* The edge of a piece of paper laid thus upon a picture is a better instrument for measuring lines or distances than dividers. It is easy and convenient to use, and then there is no danger of injuring your model with it. You make dots on the edge of the paper to mark the places of any two points in the picture, when you wish to ascertain the distance they are from each other, and to compare it with any other distance.

Difficulty in respect to the gable ends of buildings.

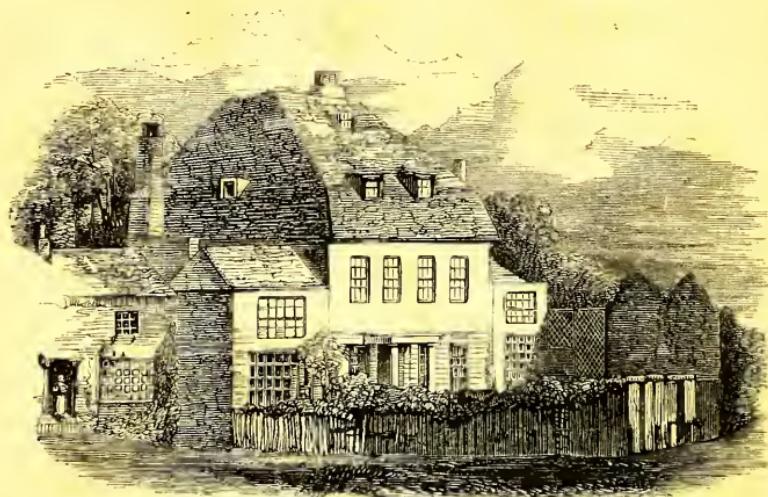
end of the line which forms the right-hand side of the portico. In the same manner, you determine the place of the upper edge of the roof of the house by observing how far it is above the central point first fixed. You make a faint line there to sketch the proper place for it. In the same manner, you determine the place where the right-hand side of the house should be drawn, where the road goes round behind it, and also the left-hand side of it, where the chimney is. You also mark the proper places for the peaks of the two gables.

Young persons, when drawing the gable ends of houses, often find it difficult to make the two sides slope alike. This is because they do not mark the places for the peaks properly. The proper way is first to draw the base-line of the gable, that is, a line across at the bottom of it from the place where the lower end of the roof-line is to come on one side, to the lower end on the other. Then *halve* this base-line, and make a faint dot in the middle of it. Then, exactly above this middle dot, make, at the right height, another dot for the peak of the roof. The peak of the roof being thus determined, the two sides can be drawn correctly without difficulty.

When you have determined the position of all these points and lines in this way, you can then draw all the parts of the building distinctly, according to the guides you have thus provided, and every thing will come right.

In the next picture you have another subject of the same kind, which will afford excellent practice for those who are sufficiently patient and persevering. In this case there is no marked point in the centre of the picture, but there is a horizontal line which comes

Proper mode of proceeding.View of a house.



GROUP OF BUILDINGS.

very nearly in the middle of it, namely, the eaves of the main building in the house. You first determine the position of this line, and mark the places where the extremities of it will come. Then you proceed to determine the limits of the other principal lines in the same way. After you have thus determined the places of a considerable number of points and lines all over the picture, you can proceed to put in the intermediate parts in a correct and proper manner. In this way you will find that you will, in the end, have every thing in its proper place, and in its proper proportions; whereas, if you had begun at one side, and proceeded, without any determinate points to guide you, across to the other, you would have made a very distorted copy of your model.

Drawing figures.Ellen Linn and Annie.

STUDY XXXVI.

FUNNIGO.

IT is easier to draw buildings and landscapes than figures, but the art of drawing figures is much the most useful accomplishment of the two.

One of the great advantages of learning to draw is to be able to make pictures to amuse children with. Older brothers and sisters can amuse the younger children in this way very much, if they have learned to draw figures well, and can invent interesting groups of them. By this means you can not only give your younger brothers and sisters a great deal of pleasure, but you can acquire a great influence over them, and this influence you can then turn to useful account in a great many ways.

A girl named Ellen Linn used to draw pictures in this way to amuse her sister Annie. Annie was, in a great measure, under her charge, and Ellen used to draw pictures for her, as a reward, when she had been a good girl.

Sometimes Ellen would make a little book of white paper, and write a story in it, drawing pictures on the several pages to illustrate the story. Sometimes these pictures were comic, and then they would amuse Annie very much indeed. Ellen would put a cover of blue paper on the book, and sew the leaves and the cover together with her needle and thread. She would then write a title for the book on the outside of the cover.

The book would be written in very plain handwriting—much

Ellen Linn's history of Funnigo.

Father's hat and boots.

like print ; and Annie would read it over and over again, and look at the pictures. This taught her to read.

One of the books which she wrote was entitled the History of Funnigo. It was as follows :

THE HISTORY OF FUNNIGO.

Once there was a boy, and his name was Phonny. As, however, I do not wish to be too personal in this narrative, I shall call him Funnigo.

One day Funnigo put on his father's hat and boots. It was

when he was about five years old. Here you see a picture of him. He is marching about, and he makes a very comical figure. He is not quite certain whether his mother will not tell him that he must not take these things, so he is looking toward her to see. His mother is busy at her work, and does not yet notice him. He is waiting for her to look up.



HAT AND BOOTS.

See how intent the expression of his countenance is as he waits for her to see him. He is wondering what she will say. If she says nothing, he will go on marching about the room. If she says

 Funnigo and Malleville with their trumpet and drum.

that he must not do so, then he will go and put the hat and boots away. He found them in a closet in the entry.

Funnigo liked very much to make a noise. He had a trumpet and a drum. He also had a cap with a feather in it. He used to like very much to get his trumpet and his drum, and march about and make a noise with them in the shed. In such cases, he would

take the drum himself, and give the trumpet to his little cousin Malleville.

Here you see a representation of Funnigo and Malleville marching about with their drum and trumpet. Malleville is sounding the trumpet, while Funnigo beats the drum.

Funnigo was very careful not to make a

noise in the house with his trumpet and his drum. This was right. It was also *wise*; for his father, when he found that his boy would never disturb other people with noisy playthings, made no objection to his having as many noisy playthings as he pleased. When children have no discretion about the use of noisy playthings, the only way is not to let them have such playthings at all.

One day Funnigo and Malleville went out into the fields to take a walk. They saw a butterfly.



TRUMPET AND DRUM.

Funnigo and Malleville looking at the butterfly.

"Ah, there's a butterfly!" said Malleville. "Let us go and catch him!"

"No," said Funnigo, "we will not catch him, for if we do, we shall crush him in our hands and spoil him. We will run along after him as he flies through the air, and look at him."

Here is a picture of Funnigo and Malleville running along after the butterfly to look at him as he flies through the air.



LOOKING AT THE BUTTERFLY.

Funnigo was right in not wishing to catch the butterfly. It is a great deal better to see birds and butterflies enjoying themselves, flying about where they please, than catching and confining them. Butterflies are almost always killed in being caught, and birds, though boys may sometimes catch them without hurting them, almost always die in their cages before they have been

long confined.

You can see by the picture that Funnigo and Malleville are not trying to catch the butterfly. They are only pointing at him. Funnigo is pointing at him, and Malleville is pointing at him too.

"See," they say, "what beautiful spots he has on his wings."

Ellen's last picture.

Wading after pond lilies.

There is no harm, however, in gathering flowers when you see any that please you. Here we have a picture of Funnigo wading



WADING.

out to get some lilies that he saw growing on the surface of a pond. He has taken off nearly all his clothes and laid them on the bank. The water is pretty deep, but he knows that it is not over his head, and so he is not afraid. He will get two pond lilies, and he will give one of them to Malleville.

This is the end of the story of Funnigo.

The readers of this book will find the pictures which Ellen drew in her story of Funnigo very good drawing lessons for them to copy.

Additional directions in respect to drawing figures.

STUDY XXXVII.

DRAWING FIGURES.

As I believe I have already intimated in a previous study, it is much more difficult to draw figures, like those which Ellen Linn was accustomed to draw to amuse her sister Annie, than buildings, or any other forms that are bounded by straight lines ; still, by attending carefully to the following directions, intelligent, patient, and persevering children will succeed.

In drawing figures, you must proceed in the same way, in respect to marking out for yourself limits and guides, as was directed in the case of a group of buildings. It will not do to begin at the top, and come down regularly to the bottom, without any thought of where you are going, and how you are coming out, as many children do. You must consider carefully where you are going, and how you are coming out, and *mark your way*, as it were, beforehand, or you will be pretty sure to go wrong and to come out wrong.

On the opposite page is a drawing of a shepherdess among the mountains tending her sheep. Suppose you undertake to copy this figure. This is the way that you must proceed :

First, you must consider on what part of your paper you will have your drawing, and then touch faintly a little line, in the proper place, for the top of the head, and another for the bottom of the feet, taking care to determine these points as correctly as you can, so as to have the space which you allot for the whole length of

The shepherdess on the mountains.



THE SHEPHERDESS.

Directions for drawing figures.

Imaginary lines.

the figure on your paper as nearly as possible the same with the actual length of the figure in the model.

Then, between these two points, observe where the middle of the figure comes in the model. It is very nearly at the lower edge of the spencer or jacket. Mark a faint line, then, midway between the two previous touches which you had made on your paper, and that will denote where the bottom of the spencer is to come in your drawing. In the same manner, mark touches to denote the breadth of the dress at the bottom, and also the breadth of the waist and of the shoulders. After noting in this manner all the most important points, and the most important distances in your drawing, you can then draw the intermediate points far more easily and correctly than if you had proceeded to draw the whole at random, without the guidance and aid which these preliminary marks and bounds will afford you.

Sometimes you can derive great aid from imaginary *lines*, which you may suppose to traverse the figure in various ways. Imagine, for instance, a straight line drawn perpendicularly down through the forehead and chin of this figure to the ground. It would pass through the centre of the right shoulder, and thence down through the middle of the dress, coming out as nearly as possible through the middle of the right ankle. Now, if you sketch such a perpendicular line as this in your copy of the drawing while you are making it, it will help you very much. It will fix the place of the shoulder, and enable you to draw the shoulder correctly, by delineating half of it on one side of the line and half on the other. It will aid you, in the same manner, in drawing the dress, and it will show you also exactly where the ankle and foot will come.

Illustration of this principle.

Teaching a dog.

An ingenious boy or girl will easily imagine such lines in any figure which he is attempting to copy, and he will derive very great assistance from them.

Sometimes these lines will be within the pictures, and sometimes they will be around them.

For example, here is a picture of a girl attempting to teach her

dog his letters. Imagine a point to be taken a little distance above the middle of the girl's head, and that from this point one straight line is drawn to the left, down along the girl's back to the ground, and another to the right, down along the dog's back. These two lines would make two sides of a triangle, like the



TEACHING BRUNO.

letter A, only they would open somewhat wider at the bottom than an ordinary letter A. Now, if you were going to copy this subject, it would help you very much in the work to sketch two such lines —very faintly, of course—upon your paper, for they would show you exactly where the back of the girl and the back of the dog were to come. In the same manner, you might imagine a perpendicular line drawn down in the middle, between the other two, to the ground between the girl's feet and the dog. This line would pass

Use of guide-lines.

Various modes of introducing them.

down very nearly along the edge of the figure of the girl, on the right hand.. It is true her forehead would project over it a little, and so would the lower corner of her dress ; but such a line, if you were to draw it on your paper, would assist you very much in bringing the figure of the girl into its right place, and making it of the right proportions. You can, in this manner, sometimes imagine a *circle*, or an *oval*, or a *square*, to be drawn in some part of your model, where you see any general form which resembles either of those figures, and then sketch very faintly the outline of a similar figure in your drawing as a guide. Or, if you do not actually sketch it, you can imagine it to be there, and the very idea will aid you.

These principles are of universal application, and the more ingenuity you exercise in applying them, the more rapid your progress in drawing will be.

There are a great many more instructions that I might give, but I am drawing so near to the end of the book that it is time to write the conclusion. I will only add here, that if you wish to practice drawing figures, you will find plenty of subjects in any of your picture books.

In looking over your picture books for this purpose, that is, in search of subjects to copy, you must remember that it is not necessary at all that you should copy the *whole* of any design that you find, for you may just as well select a part of it, such as a single figure, or any one object, and omit the rest. It will often happen that some one figure in an engraving, or some one building, would make an excellent lesson for you, when the whole might be too complicated and difficult, or otherwise unsuitable. Suppose, for

Julia and her grandmother.

Description of the picture.

example, in looking through your books, you come to this engraving.



AN UNFEELING GIRL

It represents an unfeeling and selfish girl disturbing her grandmother by making a loud noise with her trumpet when her grandmother is reading. The lady is sitting in an arm-chair in the centre of the picture. She is trying to read. Her book is in her lap. She rests her left

arm upon the elbow of her chair, and shades her eyes with her hand. Her right arm she extends across the other elbow of her chair to make a gesture of remonstrance toward Julia. Julia has a trumpet and drum. Instead of going away with these things to some remote place, where the noise which they make would not disturb any one, she comes to her grandmother's room, and, pointing the trumpet toward her, she blows it as loud as she can, on purpose to disturb her. She is doing very wrong in this, and her mother, whom we see coming from another room on the left, will punish her severely.

Now the whole of this scene would be too difficult, perhaps, to draw, but there are portions of it which you might select that

It is not necessary to copy the whole of your model.

would make excellent lessons. First, there is the drum. To draw that alone would be an excellent lesson. To draw the oval properly for the top, and the convex curve for the bottom, and the cords on the side, and the shading, would be excellent practice, and the drawing, when finished, would make a very pretty object.

In the same manner, the work-table on the right would make a good subject. It would be difficult to imitate precisely the shading as you see it in the picture, but the outline might be drawn, and the end shaded lightly, so as to give it a very pretty effect. For pupils more advanced, the figure of the girl would be a good subject; and others still might undertake the figure of the grandmother.

If you should attempt to draw the figure of the grandmother, you must follow, in doing it, the principles already explained in respect to limits and guide-lines. Mark, first, the place of the top of the head, and then that of the feet, so as to determine the length of the figure correctly before you begin to draw it. Then set off the breadths of the figure at the different points—at the knees, at the waist, and at the shoulders. If you get all these points well determined at the outset, the rest will be comparatively easy.

In finishing the copy, study carefully the manner in which the wrinkles and folds of the dress are represented by the shading.

Thus you see it is not necessary always to draw the whole of any engraving. You can select from it such portion as suits your purpose.

Design with which this book has been written.

STUDY XXXVIII.

CONCLUSION.

THIS book has been written with the design of interesting the boys and girls who may receive it, in studying the engravings and pictures that they may see, with a view to understanding them more fully than they have hitherto done, and so deriving a higher pleasure from them. The instructions which have been given you here are intended to show you how to look at pictures, what things to observe in them, and how to understand and appreciate them most fully. Those who shall have read this book attentively will find, I hope, that they will now look at pictures, in some measure at least, with new interest, and will derive greater pleasure from them than heretofore.

In fact, one of the chief advantages of drawing is the effect which the practice of that art has in training the mind to a higher appreciation of the beauty of forms, and thus increasing our capacity for receiving enjoyment from the landscapes, or groups of figures which we behold in nature, or which we see represented in books of engravings, or in galleries of pictures. A boy who has drawn a pump, or an old gateway, or a log-cabin, will always afterward look on such objects with a new interest—one that he never felt before. He will see a new picturesqueness and beauty in them; and if he has drawn a great many such objects, and landscapes and buildings of various kinds, all nature will soon wear to him a new aspect. He will look at the drawings which others

Advantages of learning to draw, and the way to secure them.

have made with increased pleasure, and he will enjoy his walks and rides, and the views which he obtains of landscape scenery, and of the groups of men and of animals that he sees, far more highly than ever before.

If you wish that your taste should be cultivated and improved in this manner, you must draw; but it is not sufficient to make mere mechanical copies of patterns set for you, in a careless or unthinking manner. You must study—you must observe—you must compare—you must reason. You must work with your hand not mainly to acquire a mere manual dexterity, but as a means of maturing, developing, and defining the ideas of your mind. It is to give you some instructions in respect to the manner by which this is to be done, and more especially to teach you by example how you are to do it, that this book has been written. I hope you will not dismiss the subject from your mind by merely reading the book, but that you will put in practice the lessons which it contains.

THE END.







To day is a rainy one
you compound that by rain

E. B. Johnson.
Franklin Johnson



